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Science Applications, Inc.
2109 W. Clinton Avenue
Huntsville, Alabama 35805

July 1976

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20. ABSTRACT (Continued)

→ weapon burst height may vary from surface to a maximum of 1000 meters above ground and yields from 0.01 to 500 kilotons were considered. The calculational methodology is described and the sensitivity of the results to various quantities is presented. Results for selected source spectra are given and compared with results from the literature. Conclusions concerning the data base are presented.

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1. INTRODUCTION

The primary or initial radiation from the detonation of a nuclear weapon consists of prompt and delayed components. The prompt radiation is composed of the neutrons and gamma rays from the fission and/or fusion process and the secondary gamma rays resulting from neutron capture in the air and ground. This component is a function of the weapon source spectrum and the burst height relative to the ground. The delayed radiation is composed of the neutrons and gamma rays emitted by the decay of fission products in the fireball as well as the secondary gamma rays produced by capture of the delayed neutrons in the air and ground. This component of the radiation is also a function of the burst height. Because of the perturbed environment produced by the shock wave, the delayed component is also a function of the blast yield of the weapon. The response of a detector to these two radiation components depends on the detector response as a function of incident particle energy and the detector position relative to the burst and ground.

The purpose of this work is to develop a data base which can be used for predicting the dose and the neutron to gamma ray dose ratio due to the initial radiation from the detonation of a nuclear weapon in an air over ground geometry. The data are to be applicable for the analysis of tactical nuclear weapons and thus imply low to intermediate yield weapon bursts near the ground with the dose determined in a plane near the air-ground interface. Therefore, the weapon yields considered range from 0.01 to 500 kilotons with burst heights ranging from surface to 1000 meters above the ground. The detector plane is located 1.75 meters above the ground and extends out to a radius

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of 1400 meters. The two responses of interest are free field and armor shielded (representing personnel within an armored vehicle) tissue dose detectors. The specific dose quantities of interest for both the prompt and delayed components consist of the following:

- 1) Free-field neutron tissue dose;
- 2) Free-field gamma ray tissue dose;
- 3) Free-field secondary gamma ray tissue dose from neutron capture in the air and ground;
- 4) Armor shielded neutron tissue dose;
- 5) Armor shielded gamma ray tissue dose;
- 6) Armor shielded secondary gamma ray tissue dose from neutron capture in the air and ground; and
- 7) Armor shielded secondary gamma ray tissue dose from neutron capture in the armor.

The techniques used in generating the data base are outlined in the Methodology section of this report. A Preliminary Investigation section presents a brief cross section sensitivity analysis together with basic calculational assumptions and pertinent fundamental data. The Calculations section presents the models employed in the prediction of the prompt delayed radiation components and also discusses various aspects of the calculations. Several forms of the results for a few selected weapon burst scenarios are shown in the Results section. A Comparisons section presents comparisons of the present work with results obtained from the literature and from other calculations. The Summary section discusses some of the conclusions concerning the results of this work.

2. METHODOLOGY

It is generally recognized that to adequately predict the transport of radiation in an air over ground geometry for the burst-detector geometries of interest, the effect of the ground must be included. This effect on the prompt radiation can be quite important, especially for predicting the dose due to secondary gamma rays. For a specified weapon blast yield, the ground affects the shock wave and the rate of fireball rise, both of which influence the time integrated delayed dose.

2.1 PROMPT RADIATION

Since the dose from any source spectrum is required, it is convenient to solve the adjoint form of the transport equation. The detector response as a function of energy is then the source term and the transport equation is solved for the adjoint flux, also referred to as the source energy importance. The source energy importance represents the importance or value of a source particle of a given energy at a given source-detector distance in contributing to the dose and forms the basis for a data base to be used in subsequent studies. Folding a source spectrum with this importance function will give the dose. The data base is to be used to predict the dose for any height of burst up to 1000 meters and for detector ground ranges from 0.0 to 1400.0 meters. Monte Carlo methods for solving the adjoint form of the transport equation are available but are judged to be impractical in view of the requirement that the source energy importance function is to be defined at a large number of positions. Two-dimensional discrete ordinates solutions to the adjoint transport equation satisfy the requirements. Therefore, the two-dimensional discrete ordinates code,

DOTSAI⁽¹⁾, was used to calculate the source energy importance distributions for the two detector responses.

Since an analytic first collision source treatment was utilized, the results of the calculations are eleven matrices consisting of the importance of uncollided and scattered source particles in contributing to the dose type as a function of source particle energy and spatial distribution. These eleven distributions are for the importance of:

- 1) Uncollided neutrons in contributing to the neutron free-field tissue dose;
- 2) Scattered neutrons in contributing to the neutron free-field tissue dose;
- 3) Scattered neutrons in contributing to the air and ground induced secondary gamma ray free-field tissue dose;
- 4) Uncollided gamma rays in contributing to the gamma ray free-field tissue dose;
- 5) Scattered gamma rays in contributing to the gamma ray free-field tissue dose;
- 6) Uncollided neutrons in contributing to the neutron armor shielded tissue dose;
- 7) Scattered neutrons in contributing to the neutron armor shielded tissue dose;
- 8) Scattered neutrons in contributing to the air and ground induced secondary gamma ray armor shielded tissue dose;

- 9) Scattered neutrons in contributing to the armor induced secondary gamma ray armor shielded tissue dose;
- 10) Uncollided gamma rays in contributing to the gamma ray armor shielded tissue dose; and
- 11) Scattered gamma rays in contributing to the gamma ray armor shielded tissue dose.

2.2 DELAYED RADIATION

The solution technique employed for the prompt radiation component is impractical for the delayed radiation. The fission products are in the rising and expanding fireball and thus the geometry changes with time. The time decay of the source spectra for the delayed components is assumed to be independent of energy. The air density is determined by the shock wave and the source intensity viewed by the detector is affected by the rate of fireball rise. Both of these properties are functions of the weapon blast yield and burst height. Thus, for a given burst scenario the delayed component scales directly only with the fission yield. Because of these factors a different technical approach was utilized for the delayed radiation.

Existing methods for predicting dose from the delayed radiation component are based on the assumption that $4\pi R^2$ dose in air scales directly with ρR , often referred to as ρR scaling, where ρR is the mass thickness of air between the source and the detector. Obviously, any

calculational method must model the shock wave - fireball phenomenology. The IDEA^(2,3) code incorporates such a model and is designed to predict the prompt and delayed integrated dose in air. The shock wave and fireball phenomenology include the effect of the ground. Therefore, the IDEA code was utilized in the following manner. The delayed neutron and fission product gamma ray source spectra for a unit source strength were folded with the source energy importance distributions, resulting in the delayed dose/source particle in uniform density air for all burst heights and detector locations of interest. The various components were then converted to $4\pi R^2$ dose as a function of rho-R. As the time incremented blast phenomenology is treated in IDEA, dose rates are derived from this matrix utilizing rho-R scaling. The advantages of this procedure are that the effect of the ground on the dose is thus implicit and a consistent cross section data base is utilized. The disadvantage is that many weapon burst scenarios must be investigated to generate the appropriate delayed dose portion of the data base. Techniques must then be developed for applying the results to environments not explicitly calculated.

In summary, the fundamental calculational technique is the solution of the adjoint form of the transport equation to determine source particle importance distributions as a function of source energy and source location. The implementation of this method for predicting both the prompt and delayed dose components will be described in more detail in the Calculations section.

3. PRELIMINARY INVESTIGATIONS

The first phase of the effort to prepare a tactical nuclear weapons radiation environment data base consisted of preliminary investigations to determine an appropriate cross section data base and group structure, the sensitivity of results to ground composition, appropriate response functions, etc. Each of these items as well as other input data are discussed in this section.

3.1 CROSS SECTIONS

Previous calculations of radiation environments for an air over ground geometry were performed using cross sections of the 1967 era. More recent point cross section data have been incorporated in the Evaluated Nuclear Data File, Version IV (ENDF/IV) used in processing a DNA coupled 37-21 neutron-gamma ray library maintained and distributed by the Radiation Shielding Information Center (RSIC) as DPL-31. Another multigroup library generated in 1970 has been distributed by RSIC as the CASK Library (DLC-23). Additionally, a 22-18 neutron-gamma ray SAI library was processed in the Spring of 1974 from the best point data available including the ENDF/IV data.

3.1.1 Air Cross Sections

The transport of radiation in an air over ground geometry is dominated by the cross sections of nitrogen and oxygen with the importance of the ground cross sections appearing in the calculation of the secondary gamma ray component. To determine the adequacy of the nitrogen cross section - the dominant element for air - comparisons of calculations with experiments were made. Previous work⁽⁴⁾ has demonstrated the differences to be expected in results calculated with the older cross sections (frequently referred to as

the Straker set)⁽⁵⁾ and the newer ones (frequently referred to as the Young set)⁽⁶⁾.

The agreement between experiment and calculation is used as a measure of the state-of-knowledge of the cross sections. Recent integral experiments at Intelcom Radiation Tech (IRT)⁽⁷⁾ and Christian Albrechts University⁽⁸⁾ offer new results which can be used to evaluate the adequacy of differential nuclear data.

3.1.1.1 IRT Pulsed Sphere Experiment

The MORSE code with combinatorial geometry⁽⁹⁾ was used to calculate the IRT pulsed sphere experiment. The experimental geometry was modeled by including only the spherical styrofoam container and the liquid nitrogen. Both forward and adjoint calculations were performed using the Straker and Young cross section sets. The experimental results are presented as a function of incident neutron energy and therefore adjoint transport calculations can be directly compared with the experimental results and are independent of the neutron source. The forward calculations were used to more efficiently investigate the gamma ray counts due to neutrons incident on the detector.

The detector efficiencies given in Table 1 were used as response functions in the forward calculations and as sources in the adjoint calculations. The gamma ray response for neutrons incident on the detector is included in the detector efficiency for gamma rays.

In the forward calculations the detector counts were scored as a function of time. The time and energy distribution of source neutrons was utilized. In order to compare with the adjoint results, the detector counts were transformed from time space to energy space and divided by the source intensity to give detector counts per incident neutron/cm² versus incident neutron energy.

Table 1. Detector efficiency.

Incident Particle	Energy (MeV)	Counts Per Incident Particle	
		Neutron	Gamma Ray
Neutrons	12.2 - 15.0	0.142	0.0116
	10.0 - 12.2	0.150	0.0134
	8.18 - 10.0	0.162	0.0125
	6.36 - 8.18	0.180	0.01
	4.96 - 6.36	0.208	0.0075
	4.06 - 4.96	0.203	0.00525
	3.01 - 4.06	0.249	0.00375
	2.46 - 3.01	0.266	0.0025
	2.35 - 2.46	0.270	0.0019
	1.826 - 2.35	0.270	0.0016
	1.108 - 1.826	0.244	0.00125
	0.55 - 1.108	0.060	0.001
Gamma Rays	8.0 - 10.0	0.0	0.16
	6.5 - 8.0	0.0	0.163
	5.0 - 6.5	0.0	0.166
	4.0 - 5.0	0.0	0.170
	3.0 - 4.0	0.0	0.173
	2.5 - 3.0	0.0	0.176
	2.0 - 2.5	0.0	0.179
	1.66 - 2.0	0.0	0.183
	1.33 - 1.66	0.0	0.185
	1.0 - 1.33	0.0	0.186
	0.8 - 1.0	0.0	0.182
	0.6 - 0.8	0.0	0.170
	0.4 - 0.6	0.0	0.150
	0.3 - 0.4	0.0	0.070

The results of the adjoint transport calculations for the detector efficiencies are presented for neutron and gamma ray counts. The calculations are compared with the experimental results for a detector at 30° in Figure 1. For the neutron results at the 30° detector position, the Young cross section set gives results which are 15 - 20 percent lower than the measurements in the energy range below 7 MeV. The Straker cross sections given even poorer results. The results of the secondary gamma ray calculations using the Young cross sections give good agreement (within 10 percent) with the measurements for all of the detector positions and for neutron energies greater than 2 - 3 MeV. The Straker cross sections give results which typically are a factor of 2 high for incident neutron energies above 9 MeV and lower than the measurements for energies below 8 MeV.

3.1.1.2 Christian Albrechts University Tank Experiment

This tank experiment is similar in many respects to the GRT liquid nitrogen dewar experiment^(10, 11) which has previously been calculated using the Straker and Young cross section sets for nitrogen⁽⁴⁾. Similar calculations have been performed for the Christian Albrechts University (CAU) tank experiment. One dimensional multigroup discrete ordinates calculations were performed with the ANISN radiation transport code⁽¹²⁾. The calculations were made with a unit source in the highest energy group. For comparison with the published experimental results, the neutron energy fluxes were converted to $4\pi R^2$ fluence per unit lethargy per source neutron. The secondary gamma ray intensities are reported as $4\pi R^2$ photons per MeV per source neutron.

A comparison of the results of the tank experiment with calculations using Young and Straker cross sections for neutrons and secondary gamma rays is shown in Figures 2 and 3, respectively. For neutrons, there is better agreement between measurements and calculations using Young cross

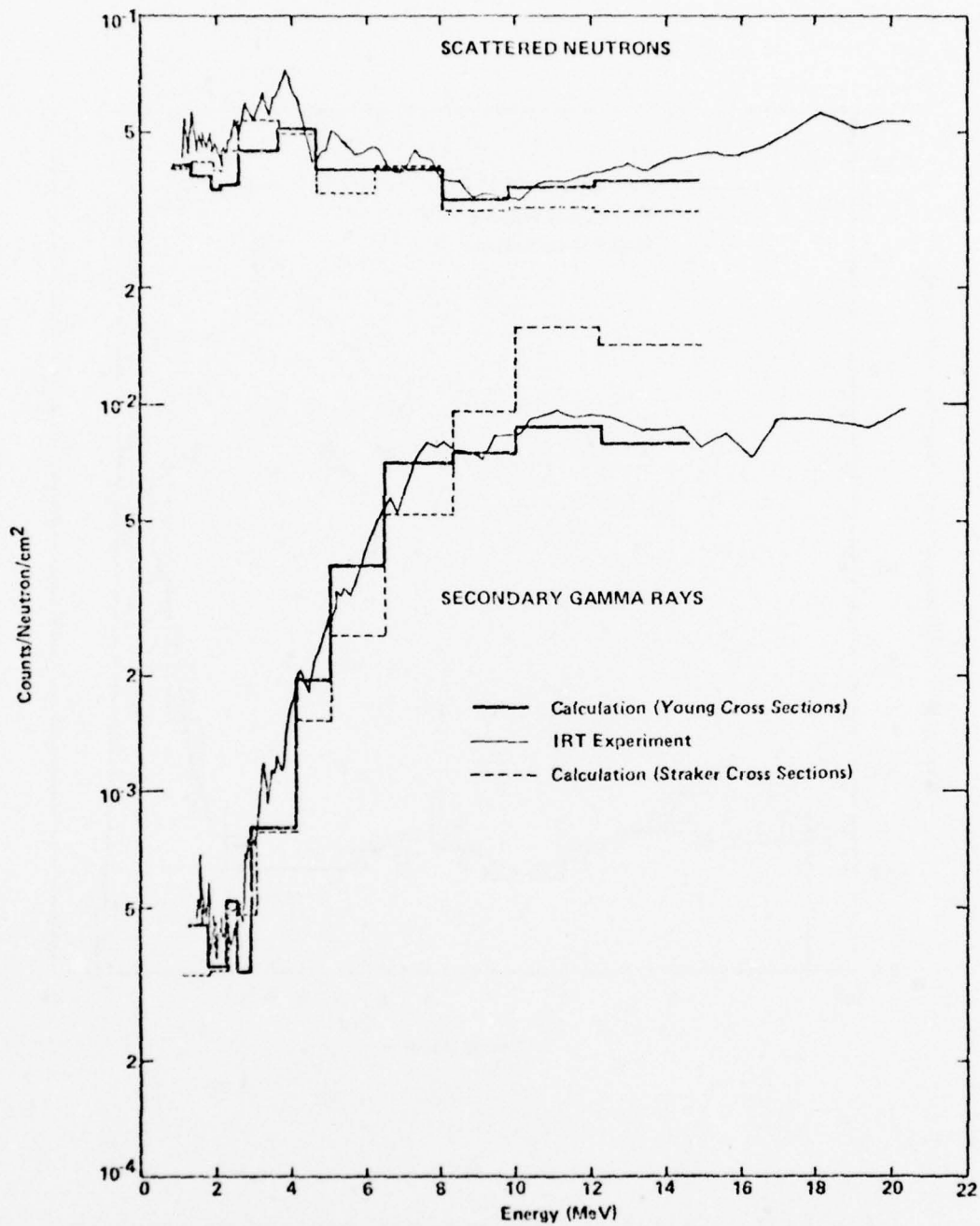


Figure 1. Calculated and measured scattered neutron and secondary gamma ray spectra at 30° from Nitrogen Sphere.

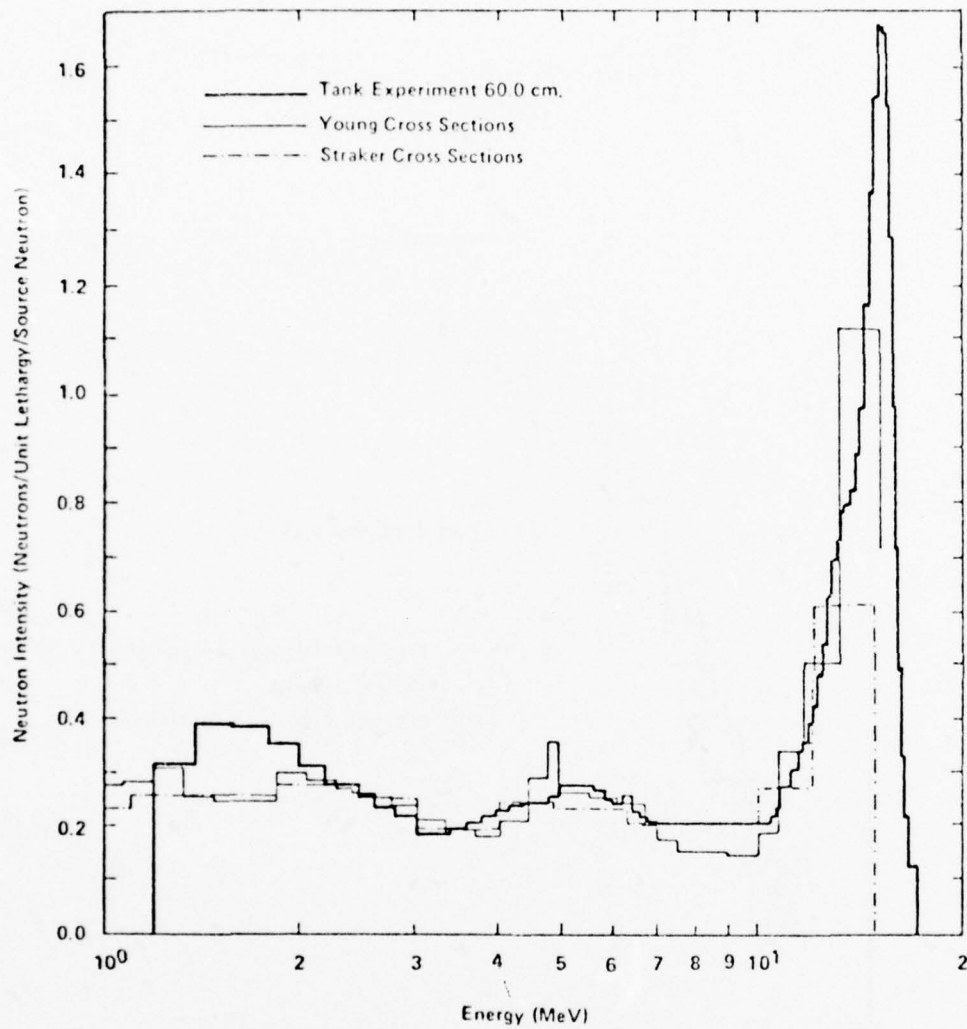


Figure 2. Calculated and measured neutron spectrum at 60 cm from a 14 MeV neutron source in liquid nitrogen.

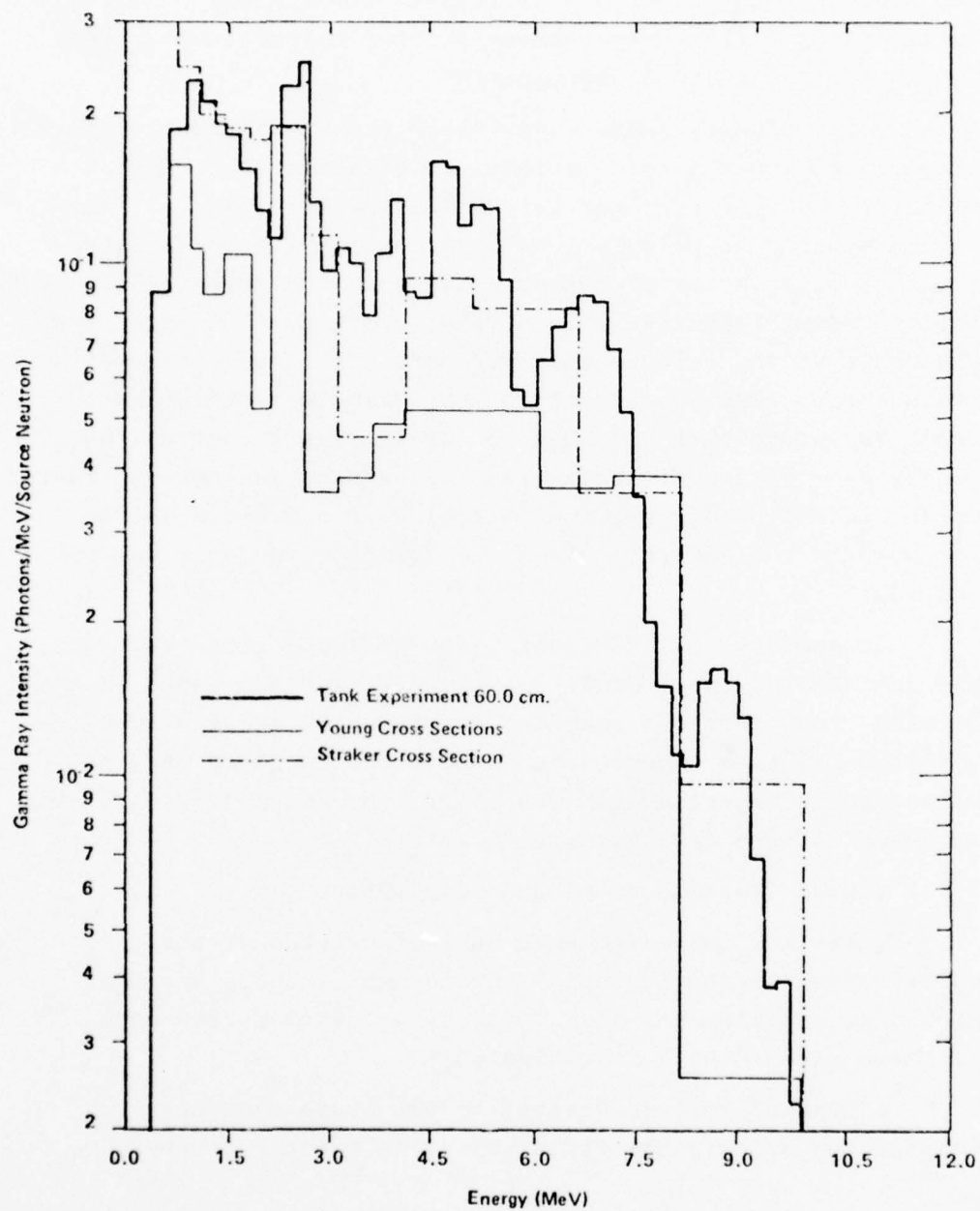


Figure 3. Calculated and measured secondary gamma ray spectrum at 60 cm from a 14 MeV neutron source in liquid nitrogen.

sections than when Straker cross sections are used. Regions of disagreement are in the source energy region around 15 MeV and around 1.5 MeV where the experiment is higher. There are fairly minor differences between the two calculations except in the region of the source energy.

For secondary gamma rays, there are significant differences between the calculations and measurements. Both calculations fall substantially below the experimental measurements with the calculations based on Young cross sections being about a factor of 2 lower than the measurement. Although the agreement is better when Straker cross sections are used, the shape of the calculated curve does not agree with the measurement. One possibility of the disagreement is that gamma ray production in the detector is significant at the deeper penetration distances and this effect was not considered in the reduction of the experimental data and could not be included in the analysis since the detector response was not provided.

In summary, calculations based on Young cross sections predict the IRT experiment, whereas calculations based on Straker cross sections provide results which agree better with the CAU tank experiment. Due to the improved data on which the Young evaluation was based, the Young evaluated set was used for the data base calculations.

3.1.2 Ground Cross Sections and Composition

There are two components that affect the ground contribution to the radiation environment. These are the ground composition and the ground cross sections and both of these factors were investigated.

A typical soil is desired in the sense that its composition affects the radiation environment. However,

the ground composition to be used in the calculations should be selected with some justification in order for the results to be generally useful. An analysis of the effects of ground composition and moisture content on the radiation environments produced at the air-ground interface was performed. The calculational model consisted of a small yield thermonuclear weapon denotated at a point 100 meters above the ground surface. Consideration was given to both a tissue dose and an armor shielded tissue dose response at a point 50 centimeters above the ground surface.

At the time of the analysis, sensitivity calculations were restricted to one dimensional geometry. The best one dimensional approximation of the air over ground problem for the investigation of ground effects is a slab geometry representation. Figure 4 shows the calculational model used in the one dimensional transport calculations. An air albedo boundary condition was used above 700 meters. Only the first 50 centimeters of ground was included in the calculation and a vacuum boundary condition was used at the bottom of the problem. Both of these boundary conditions are felt to be adequate.

The calculational approach was to assume a baseline soil composition to investigate the effects of varying the composition using first order perturbation theory. First order perturbation theory assumes that the effects of changes in soil composition on the free-field and armor shielded tissue dose are small (less than 10-15 percent). The sensitivity of the air-ground radiation environment was determined individually for a number of elements and the predicted perturbations due to various soils determined from the element sensitivities. Forward and adjoint calculations were performed with the one dimensional discrete ordinates transport code ANISN.

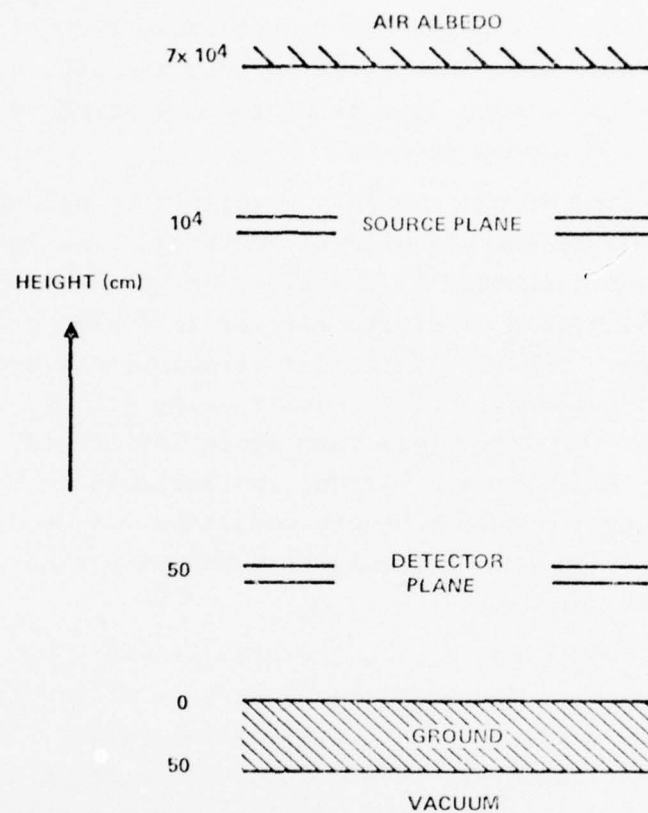


Figure 4. One dimensional calculational model used for sensitivity analysis.

A first order perturbation analysis was performed using the ANISN results and the one dimensional cross section sensitivity analysis code, SWANLAKE⁽¹³⁾. One of the results obtained from SWANLAKE is the "sensitivity" due to the perturbation cross section set. The "sensitivity" is equal to the fractional change in the total result due to the perturbation cross section, $\Delta\Sigma$. That is, the sensitivity,

$$S = \frac{\Delta R}{R}, \quad (1)$$

where

R is the total response, and

ΔR is the perturbation to the total response.

If the sensitivities, S_i , are determined for a number of elements, i , with density $1 \frac{\text{atom}}{\text{barn} \cdot \text{cm}}$, the sensitivity of a mixture of elements, S_{mix} , is given by

$$S_{\text{mix}} = \sum_{i=1}^{\text{\# elements}} N_i S_i, \quad (2)$$

where

N_i are the element densities in the mixture.

In order to estimate the perturbation to the total response due to a different soil composition, equations (1) and (2) can be combined to give,

$$\tilde{R} = R \times \left[1 + \sum_{i=1}^{\text{\# elements}} \left(\tilde{N}_i - N_i \right) \times S_i \right], \quad (3)$$

where

\tilde{R} is the perturbed response
 N_i is the element density for the baseline soil, and
 \tilde{N}_i is the element density for the desired soil.

The results of the forward and adjoint ANISN calculations for the free-field and armor shielded tissue dose are given in Table 2. The agreement of the forward and adjoint calculations is better than 0.5%. The armor shielded response due to incident gamma rays is reduced by approximately a factor of 4 for the shielded case. For this calculational model approximately 90% of the free-field response is due to incident neutrons while 97% of the armor shielded response is due to incident neutrons. The ratio of dose components is strongly dependent on the source-detector range and thus is different for larger distances.

Several soil compositions were considered. Table 3 gives the atomic concentrations (14,15) for a number of soils found in the United States and Western Europe. Results for the sensitivity of ground composition for several elements are given in Table 4 for both the free-field and armor shielded response. It is noted that hydrogen is the most important element from the sensitivity analysis. Other elements such as titanium, manganese and molybdenum are also important. The hydrogen content can be quite large in soils and vary substantially due to the moisture content. The hydrogen sensitivity is negative which means that perturbation theory predicts that the tissue dose would decrease for a small increase in hydrogen density. For the free-field case most of the large positive sensitivities result from secondary gamma ray production by these elements in the soil. However, for the shielded tissue response the secondary gamma rays

Table 2. Forward and adjoint calculated baseline tissue dose.

	Tissue Dose 50 cm Above Ground (rads/source neutron)	
	Forward	Adjoint
Free-Field		
Total	2.682×10^{-9}	2.688×10^{-9}
Neutron	2.412×10^{-9}	
Gamma Ray	2.702×10^{-10}	
Armor Shielded		
Total	2.496×10^{-9}	2.500×10^{-9}
Neutron	2.430×10^{-9}	
Gamma Ray	6.600×10^{-11}	

Table 3. Composition of United States and Western European Soils.

Atomic Concentration (atoms barn · cm)^a

Soil Type Element	mean earth's crust	Central German Soils										United States Soils						
		sand	loess	clay	marl/ loam	shale	sand- stone	marl	lime- stone	granite	basalt	gneiss	slate	soil	area wtl. average	sand (Florida)	clay (Hawaii)	Nevada desert
H	8.37(-4)	3.34(-4)	8.70(-4)	5.35(-3)	2.09(-3)	3.34(-3)	1.14(-3)	3.31(-3)	2.68(-4)	4.01(-4)	1.20(-3)	6.96(-3)	2.16(-3)	1.10(-3)	6.00(-6)	5.62(-3)	4.18(-3)	
C	1.60(-5)		8.62(-4)	4.52(-4)	1.12(-3)	7.61(-4)	1.37(-5)	1.38(-3)	5.56(-3)			4.93(-5)	1.07(-3)	1.65(-4)		4.69(-3)		
O	1.76(-2)	1.99(-2)	1.86(-2)	1.90(-2)	1.86(-2)	1.87(-2)	1.90(-2)	1.87(-2)	1.81(-2)	1.83(-2)	1.69(-2)	2.01(-2)	1.87(-2)	1.90(-2)	2.01(-2)	1.63(-2)	1.91(-2)	
Na	7.38(-4)		2.33(-4)	1.75(-4)	1.75(-4)	2.53(-4)	3.89(-5)	1.17(-4)	3.89(-5)	8.94(-4)	6.22(-4)	9.72(-6)	2.20(-4)	9.91(-5)	3.00(-7)	4.20(-5)	3.41(-4)	
Mg	5.18(-4)	1.49(-5)	2.24(-4)	5.23(-4)	3.02(-4)	3.65(-4)	1.05(-4)	3.81(-4)	1.20(-4)	2.99(-5)	8.96(-4)	4.93(-5)	3.96(-4)	1.61(-4)		8.40(-5)	9.90(-6)	
Al	1.82(-3)	1.54(-4)	9.22(-4)	1.78(-3)	1.22(-3)	1.82(-3)	1.09(-3)	1.51(-3)	1.42(-4)	1.48(-3)	1.87(-3)	3.09(-3)	1.58(-3)	7.74(-4)	1.30(-6)	4.19(-3)	1.54(-3)	
Si	5.94(-3)	9.70(-3)	6.82(-3)	5.48(-3)	5.82(-3)	5.82(-3)	7.97(-3)	4.82(-3)	4.11(-4)	7.34(-3)	4.89(-3)	5.52(-3)	5.81(-3)	6.83(-3)	1.00(-2)	2.19(-3)	6.86(-3)	
K	3.99(-4)	1.41(-4)	2.69(-4)	6.14(-4)	3.64(-4)	4.14(-4)	5.75(-4)	4.60(-4)	7.67(-5)	6.27(-4)	2.05(-4)	1.79(-5)	3.66(-4)	2.90(-4)		1.36(-4)	4.16(-4)	
Ca	5.46(-4)	1.07(-5)	7.41(-4)	3.65(-4)	9.48(-4)	3.34(-4)	1.07(-5)	1.16(-3)	5.55(-3)	5.37(-5)	9.56(-4)	1.72(-5)	6.33(-4)	9.56(-4)		6.80(-5)	3.61(-4)	
Ti	5.54(-5)				2.94(-5)	4.90(-5)		5.88(-5)		1.51(-5)	1.06(-4)	7.76(-5)	4.30(-5)	8.82(-6)	5.00(-7)	1.58(-4)	3.40(-6)	
Cr					4.24(-6)			7.64(-6)		8.49(-6)	2.55(-6)	2.55(-6)		1.27(-4)		5.00(-6)		
Mn	1.10(-5)													6.58(-5)	1.15(-6)	3.22(-4)	4.40(-6)	
Fe	5.39(-4)	1.51(-5)	1.69(-4)	3.32(-4)	2.15(-4)	5.09(-4)	2.80(-4)	3.93(-4)	5.28(-5)	2.52(-4)	9.35(-4)	4.93(-4)	4.36(-4)	1.05(-2)	1.75(-4)	5.00(-7)	1.15(-3)	2.24(-3)
Mo														1.57(-5)				

^a Atomic concentrations are given for a ground density of 1 gm cm⁻³.

^b Read as 1.34 x 10⁻³.

Table 4. Sensitivity of calculated total dose to ground composition.

Element	Sensitivity ^a		Element	Sensitivity ^a	
	Free-Field	Armor Shielded		Free-Field	Armor Shielded
H	- 33.0	- 26.5	K	5.24	- 8.40
C	0.595	1.65	Ca	0.0149	- 1.04
O	1.34	2.24	Ti	26.6	- 13.6
Na	0.462	0.892	Cr	0.798	- 7.32
Mg	1.93	2.52	Mn	18.0	- 50.2
Al	2.25	1.48	Fe	8.63	- 5.4
Si	1.33	1.34	Mo	13.5	- 1.66

^aFractional change in dose due to a 1.0 atom/(barn · cm) addition of the element.

from the ground are not as important and the sensitivity is in fact often negative. Although the sensitivity calculations were performed for a simple one-dimensional model, the results indicate that the tissue dose may vary by a factor of two or more depending on the hydrogen content of the soil.

The effect of moisture in the soil can be estimated from the element sensitivities for hydrogen and oxygen. In this manner a unit weight percent increase in moisture content would result in a -3.4% and -2.7% change in the free-field and armor shielded tissue dose, respectively. This predicted moisture content sensitivity was checked by a direct recalculation of the baseline problem with the addition of 1 weight percent water and the agreement with the perturbation calculation was quite good.

The element sensitivities were used to estimate the correction or perturbation factor given in equation 3 for all of the soil types listed in Table 2. The results are given in Table 5. In Figure 5, the ratio of the dose is plotted as a function of the hydrogen content of the various soils. It is observed that most of the variations in the dose ratio can be explained by the hydrogen content. The maximum differences observed ranged from +15% to -38%.

From this investigation which utilized a one-dimensional model, it was concluded that an area weighted average Western European soil composition was a reasonable ground composition to use in performing the calculations. The air-ground tissue response is fairly sensitive to the hydrogen content of the soil and a hydrogen density greater than 2.0×10^{-3} atoms/(barn · cm) results in a significantly reduced dose. The compositions of ground and air used in the data base calculations are given in Table 6.

Table 5. Sensitivity of calculated total dose to soil type.

Soil Type	Correction Factor, C ^a	
	Free Field	Armor Shielded
Mean Earth's Crust	1.0	1.0
Central German Soils		
sand	1.03	1.06
loess	0.99	1.02
clay	0.71	0.78
marl/loam	0.92	0.95
shale	0.84	0.88
sandstone	0.98	1.0
marl	0.84	0.88
limestone	1.01	1.04
granite	1.03	1.04
bassalt	0.99	0.98
gneiss	0.61	0.70
slate	0.92	0.95
tsoil	1.15	0.85
area weighted	0.98	1.01
United States Soils		
beach sand	1.05	1.08
lava clay	0.72	0.72
Nevada dessert	0.82	0.82

^aThe correction factor is the ratio of the dose expected for the particular soil and the dose obtained for the baseline case.

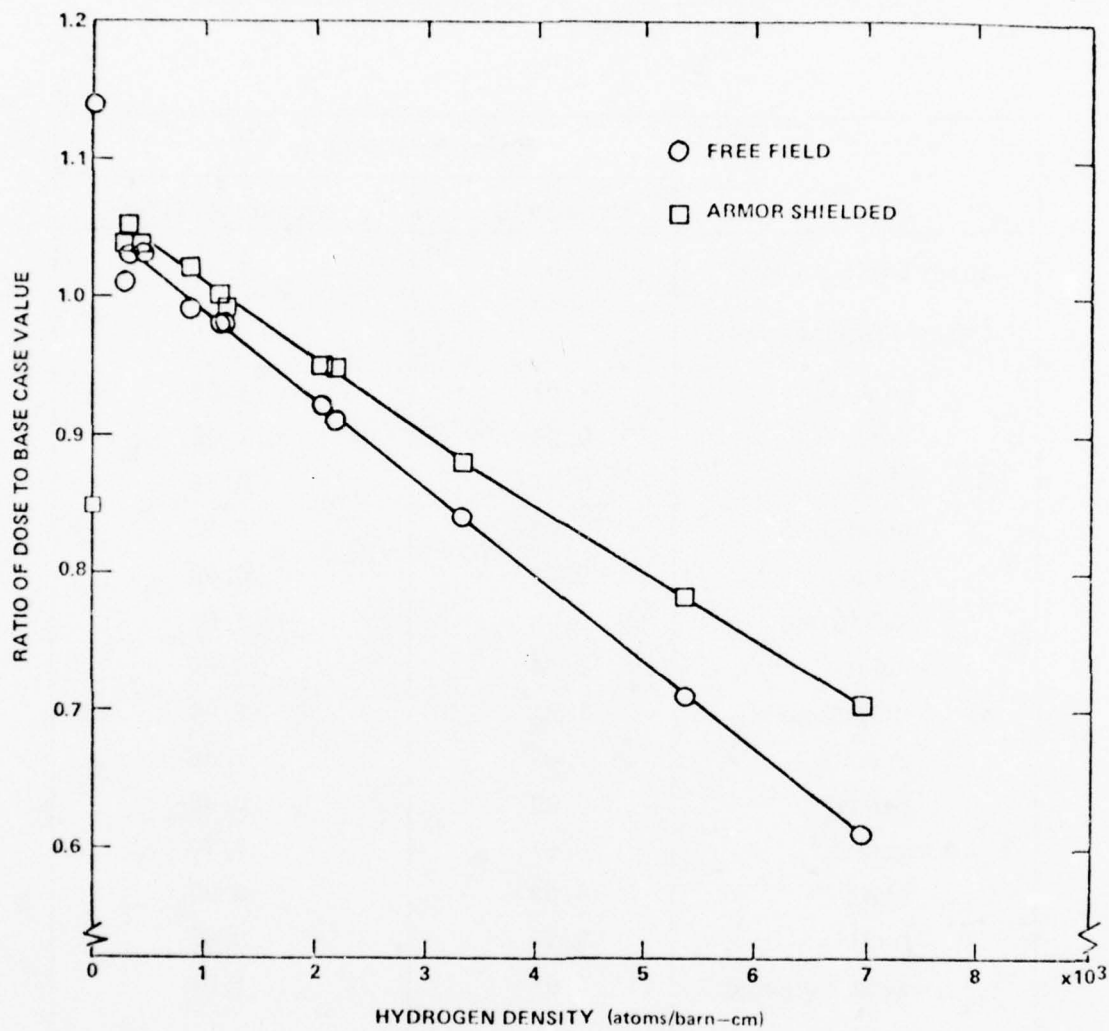


Figure 5. Correlation of total tissue dose with hydrogen content of soil.

Table 6. Air and ground composition for tactical nuclear weapons data base calculations.

Element	Atoms/(barn · centimeter)	
	Air ^a ($1.11 \times 10^{-3} \text{ gm/cm}^3$)	Ground (1.6 gm/cm^3)
H		1.753 (-3)
C		1.639 (-3)
N	3.635 (-5)	
O	9.620 (-6)	3.035 (-2)
Na		1.586 (-4)
Mg		2.577 (-4)
Al		6.969 (-3)
Si		1.093 (-2)
K		4.922 (-4)
Ca		1.529 (-3)
Fe		2.795 (-4)

^aFinal data base results rho-R scaled to 1.19 mg/cm^3 air density (see Section 4.2)

The other component of the effect of the ground is that due to the cross sections for the elements in the ground. The same calculational model used to investigate the effect of composition was also used to determine the effect of using different cross section sets. The CASK, SAI and DNA libraries were used to calculate the free field and armor shielded tissue dose due to a thermonuclear source. Due to the lack of cross sections for some elements in the libraries, different ground compositions were used and are given in Table 7. The results of the calculations are shown in Table 8. It is noted that the different cross sections have little effect (less than 5%) on the results.

The cross section set used for the calculations was the DNA library. In order to reduce computational effort and the size of the resulting data base, the cross sections were collapsed with ANISN to a 23-19 neutron-gamma ray library using the spectrum in air due to a thermonuclear source. The group structure is given in Table 9.

Table 7. Soil composition used with each cross section set.

Element	Soil Composition (atoms/barn · cm)		
	CASK 22-18 Average Soil	SAI 22-18 Average Soil	DNA 38-21 Average Soil
H	1.753 (-3)	1.753 (-3)	1.753 (-3)
C	1.639 (-3)	1.639 (-3)	1.639 (-3)
O	3.035 (-2)	3.035 (-2)	3.035 (-2)
Na	1.586 (-4)	0.0	1.586 (-4)
Mg	2.577 (-4)	2.577 (-4)	2.577 (-4)
Al	6.969 (-3)	6.969 (-3)	6.969 (-3)
Si	1.093 (-2)	1.093 (-2)	1.093 (-2)
K	4.922 (-4)	0.0	4.922 (-4)
Ca	1.529 (-3)	1.529 (-3)	1.529 (-3)
Ti	1.411 (-5)	1.411 (-5)	0.0
Mn	1.833 (-6)	0.0	0.0
Fe	2.795 (-4)	2.795 (-4)	2.795 (-4)

Table 8. Calculated total tissue dose as a function of cross section set.

	Cross Section Set		
	CASK 22-18	SAI 22-18	DNA 38-21
	Total Tissue Dose (rads/source neutron)		
Shielded	2.529 (-9)	2.493 (-9)	2.600 (-9)
Unshielded	2.661 (-9)	2.593 (-9)	2.715 (-9)

Table 9. Energy group structure of tactical nuclear weapons radiation environment data base.

Neutron Group	Energy (eV)	Gamma Ray Group	Energy (eV)
1	1.5 (+7) - 1.22 (+7)	1	1.0 (+7) - 8.0 (+6)
2	1.22 (+7) - 1.00 (+7)	2	8.0 (+6) - 6.0 (+6)
3	1.00 (+7) - 8.18 (+6)	3	6.0 (+6) - 5.0 (+6)
4	8.18 (+6) - 6.37 (+6)	4	5.0 (+6) - 4.0 (+6)
5	6.37 (+6) - 4.96 (+6)	5	4.0 (+6) - 3.0 (+6)
6	4.96 (+6) - 4.06 (+6)	6	3.0 (+6) - 2.5 (+6)
7	4.06 (+6) - 3.01 (+6)	7	2.5 (+6) - 2.0 (+6)
8	3.01 (+6) - 2.38 (+6)	8	2.0 (+6) - 1.5 (+6)
9	2.38 (+6) - 2.30 (+6)	9	1.5 (+6) - 1.0 (+6)
10	2.30 (+6) - 1.83 (+6)	10	1.0 (+6) - 7.0 (+5)
11	1.83 (+6) - 1.11 (+6)	11	7.0 (+5) - 4.5 (+5)
12	1.11 (+6) - 5.50 (+5)	12	4.5 (+5) - 3.0 (+5)
13	5.50 (+5) - 1.11 (+5)	13	3.0 (+5) - 1.5 (+5)
14	1.11 (+5) - 2.18 (+4)	14	1.5 (+5) - 1.0 (+5)
15	2.18 (+4) - 3.35 (+3)	15	1.0 (+5) - 7.0 (+4)
16	3.35 (+3) - 5.83 (+2)	16	7.0 (+4) - 4.5 (+4)
17	5.83 (+2) - 1.01 (+2)	17	4.5 (+4) - 3.0 (+4)
18	1.01 (+2) - 2.90 (+1)	18	3.0 (+4) - 2.0 (+4)
19	2.90 (+1) - 1.07 (+1)	19	
20	1.07 (+1) - 3.06 (+0)		
21	3.06 (+0) - 1.12 (+0)		
22	1.12 (+0) - 4.14 (-1)		
23	4.14 (-1) - 1.00 (-5)		

3.2 RESPONSE FUNCTIONS

The biological response to radiation is the quantity of interest in this study. Tissue kerma for the free field, i.e., radiation environment in a flat earth geometry, was chosen as the response function. It was also desirable to provide information on the extent of shielding provided by a light armored tank. The response function of a complex vehicle depends upon the energy-angular description of the radiation incident upon the tank as well as the specific location of the detector within the tank. Because of random orientation of a vehicle with respect to a burst and of the several locations within a tank, a simplified model was used to determine an armor shielded tissue response function.

A one dimensional calculational model, illustrated in Figure 6, was used with a tissue kerma response at the center. The armor composition is given in Table 10. Adjoint calculations were performed to determine the neutron and gamma ray response of the shielded detector. The neutron response consists of the neutron dose inside due to incident neutrons and a component of the gamma ray dose inside due to gamma rays produced in the armor by the incident neutrons. The incident gamma rays also contribute to the gamma ray dose inside. Table 11 gives the free-field and armor shielded detector tissue response functions.

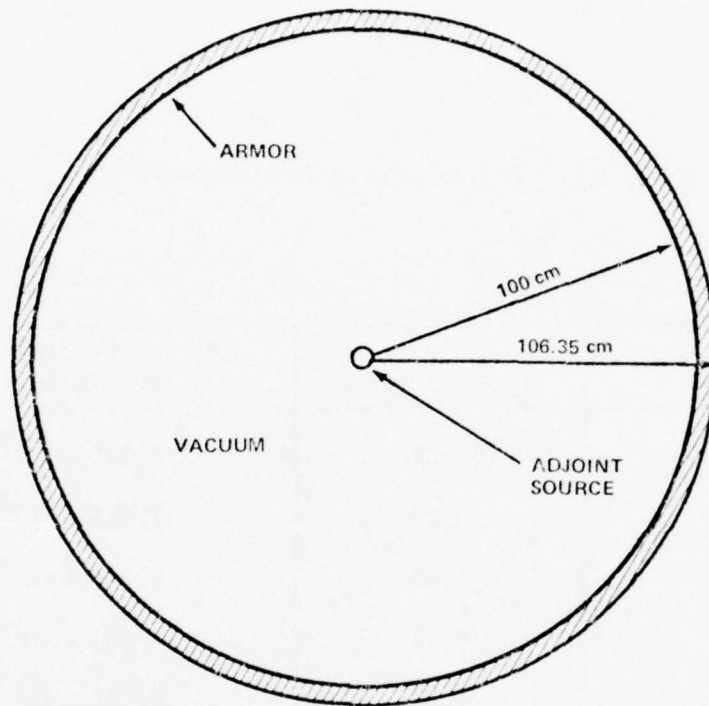


Figure 6. Armor shielded tissue dose response function calculational model

Table 10. Light tank armor composition.

Element	Weight Percent	Atomic Concentration atoms/(barn · cm)
Fe	95.63	8.097×10^{-2}
C	0.27	1.063×10^{-3}
Mn	1.03	8.866×10^{-4}
Si	0.48	8.081×10^{-4}
Cr	1.07	9.729×10^{-4}
Ni	0.97	7.813×10^{-4}
Mo	0.55	2.711×10^{-4}

Table 11. Free-field and armor shielded detector tissue response functions.

Group [Neutrons]	Upper Energy (eV)	Tissue Kerma Factor (rads · cm ² /incident/particle)			
		Free Field	Armor Shielded Neutron	Gamma Ray	Total
1	1.50 (+7)	6.36 (- 9)	4.30 (- 9)	3.67 (-10)	4.67 (- 9)
2	1.22 (+7)	5.74 (- 9)	3.77 (- 9)	3.96 (-10)	4.17 (- 9)
3	1.00 (+7)	5.17 (- 9)	3.51 (- 9)	4.03 (-10)	3.91 (- 9)
4	8.18 (+6)	4.87 (- 9)	3.20 (- 9)	3.49 (-10)	3.55 (- 9)
5	6.37 (+6)	4.51 (- 9)	3.02 (- 9)	2.76 (-10)	3.30 (- 9)
6	4.96 (+6)	4.21 (- 9)	2.74 (- 9)	2.06 (-10)	2.94 (- 9)
7	4.06 (+6)	3.98 (- 9)	2.64 (- 9)	1.27 (-10)	2.77 (- 9)
8	3.01 (+6)	3.39 (- 9)	2.47 (- 9)	5.74 (-11)	2.53 (- 9)
9	2.38 (+6)	3.07 (- 9)	2.31 (- 9)	4.24 (-11)	2.35 (- 9)
10	2.30 (+6)	3.05 (- 9)	2.31 (- 9)	4.07 (-11)	2.35 (- 9)
11	1.83 (+6)	2.63 (- 9)	2.08 (- 9)	2.71 (-11)	2.11 (- 9)
12	1.11 (+6)	2.05 (- 9)	1.84 (- 9)	1.08 (-11)	1.85 (- 9)
13	5.50 (+5)	1.27 (- 9)	1.21 (- 9)	7.87 (-12)	1.22 (- 9)
14	1.11 (+5)	4.00 (-10)	3.25 (-10)	2.75 (-11)	3.53 (-10)
15	2.13 (+4)	4.00 (-10)	3.25 (-10)	2.75 (-11)	3.53 (-10)
16	3.35 (+3)	1.96 (-11)	8.91 (-12)	8.19 (-11)	9.08 (-11)
17	5.83 (+2)	3.67 (-12)	1.40 (-12)	4.25 (-11)	4.39 (-11)
18	1.01 (+2)	1.17 (-12)	6.27 (-13)	5.57 (-11)	5.64 (-11)
19	2.90 (+1)	1.11 (-12)	8.12 (-13)	1.04 (-10)	1.04 (-10)
20	1.07 (+1)	1.62 (-12)	8.27 (-13)	1.37 (-10)	1.38 (-10)
21	3.06 (+0)	2.65 (-12)	7.68 (-13)	1.95 (-10)	1.96 (-10)
22	1.12 (+0)	4.26 (-12)	5.67 (-13)	3.07 (-10)	3.08 (-10)
23	4.14 (-1)	9.35 (-12)	1.13 (-13)	6.47 (-10)	6.47 (-10)
[Gamma Rays]					
24	1.00 (+7)	2.42 (- 9)	0.0	7.12 (-10)	7.12 (-10)
25	8.00 (+6)	1.95 (- 9)	0.0	6.03 (-10)	6.03 (-10)
26	6.00 (+6)	1.84 (- 9)	0.0	5.77 (-10)	5.77 (-10)
27	5.00 (+6)	1.59 (- 9)	0.0	4.74 (-10)	4.74 (-10)
28	4.00 (+6)	1.27 (- 9)	0.0	3.67 (-10)	3.67 (-10)
29	3.00 (+6)	1.03 (- 9)	0.0	2.86 (-10)	2.86 (-10)
30	2.50 (+6)	8.75 (-10)	0.0	2.16 (-10)	2.16 (-10)
31	2.00 (+6)	7.05 (-10)	0.0	1.49 (-10)	1.49 (-10)
32	1.50 (+6)	5.70 (-10)	0.0	9.35 (-11)	9.35 (-11)
33	1.00 (+6)	4.13 (-10)	0.0	4.18 (-11)	4.18 (-11)
34	7.00 (+5)	2.94 (-10)	0.0	1.91 (-11)	1.91 (-11)
35	4.50 (+5)	2.03 (-10)	0.0	7.01 (-12)	7.01 (-12)
36	3.00 (+5)	1.03 (-10)	0.0	7.04 (-13)	7.04 (-13)
37	1.50 (+5)	6.60 (-11)	0.0	1.22 (-14)	1.22 (-14)
38	1.00 (+5)	3.90 (-11)	0.0	0.0	0.0
39	7.00 (+4)	4.79 (-11)	0.0	0.0	0.0
40	4.50 (+4)	8.37 (-11)	0.0	0.0	0.0
41	3.00 (+4)	8.37 (-11)	0.0	0.0	0.0
42	2.00 (+4)	8.37 (-11)	0.0	0.0	0.0

4. CALCULATIONS

The calculations performed in generating the data base for the prompt and delayed dose components are described in this section. The solution techniques outlined previously are further explained and difficulties encountered are noted and discussed.

4.1 SOURCE ENERGY IMPORTANCE DISTRIBUTIONS IN UNIFORM DENSITY AIR OVER GROUND

4.1.1 Geometry Model

The two dimensional discrete ordinates multigroup code DOTSAI was used to calculate the energy and space dependent source importance distributions for the free-field and armor shielded tissue dose detectors. The calculations were performed in R-Z geometry using the model depicted in Figure 7. The point detector response function (the adjoint source) is located 1.75 meters above the ground of thickness 1.0 meter. The model extends to 1500 meters in the radial direction and for a nominal distance of 1275 meters above the ground. An air density of $1.11 \times 10^{-3} \text{ gm/cm}^3$ was used.

4.1.2 Boundary Conditions

The calculations were performed in cylindrical geometry and the left boundary is treated as the axis of symmetry with a reflected boundary condition. The top, right and bottom boundaries are defined with an albedo boundary condition. The albedo boundary condition implemented in DOTSAI is a modified white boundary condition in that a fraction (the "albedo") of the exiting particles are returned with an isotropic angular distribution. The required albedos can be calculated from one-dimensional ANISN calculations using the output boundary currents to calculate the albedo as the incoming current divided by the exiting current.

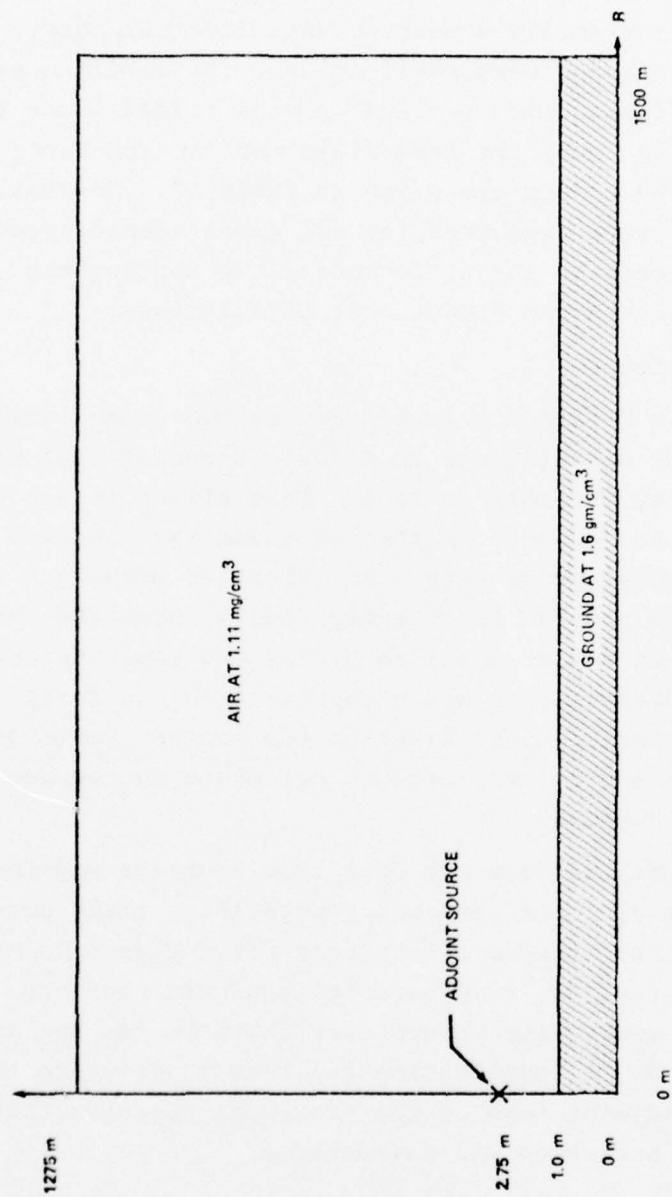


Figure 7. Geometry model for two dimensional adjoint calculations.

Calculated in this manner, the change in energy distribution of the incoming particles is implicit and is consistent with the manner in which the albedo is used in DOTSAI. For each of the five response function sources, the albedo for air and ground was calculated. The differences among the free-field neutron, armor shielded neutron and armor secondary gamma ray source albedos were small as were the differences between the free-field gamma ray and armor shielded gamma ray sources. Therefore, only the free-field neutron and gamma ray albedos for air and ground are given in Table 12. However, since the albedos were generated for all given source spectra, primarily to investigate any differences, the appropriate albedo was used in the two dimensional calculations.

4.1.3 Source Treatment

A well known difficulty in performing two dimensional discrete ordinates calculations in a low scattering medium is the discrete ray streaming effect. This effect is due to the preferential transport of particles along the discrete angles of the angular quadrature. An effective technique to help alleviate the problem is to analytically calculate the energy and space dependent uncollided flux and generate the source particle distribution which results from the first collision. This technique of treating the source, known as a first collision source, was used to calculate the source importance distributions.

To distinguish between the dose from neutrons and the dose from gamma rays it is necessary to separate these portions of the detector response functions for use as adjoint source terms. Therefore, five calculations were required to determine the source importance distributions for the dose quantities desired. A complication apparently unique to the solution of the adjoint form of the transport equation for the calculations performed was encountered.

Table 12. Adjoint air and ground albedo for free-field neutron and gamma ray tissue response function source.

E _{High} (MeV) [Neutrons]	Neutron Response Source		Gamma Ray Response Source	
	Air	Ground	Air	Ground
1.50 (+1)	1.568 (-1)	1.688 (-1)	2.899 (-1)	4.734 (-1)
1.22 (+1)	1.771 (-1)	2.024 (-1)	2.934 (-1)	5.007 (-1)
1.00 (+1)	1.414 (-1)	1.930 (-1)	2.436 (-1)	4.934 (-1)
8.13 (+0)	1.548 (-1)	2.060 (-1)	2.450 (-1)	5.189 (-1)
6.37	1.515 (-1)	1.978 (-1)	2.682 (-1)	5.410 (-1)
4.96	1.735 (-1)	2.162 (-1)	3.705 (-1)	5.684 (-1)
4.06	4.283 (-1)	3.985 (-1)	5.904 (-1)	6.745 (-1)
3.01	1.659 (-1)	1.773 (-1)	4.205 (-1)	5.509 (-1)
2.38	1.034 (-1)	4.555 (-2)	3.435 (-1)	4.492 (-1)
2.30	1.633 (-1)	2.446 (-1)	4.260 (-1)	6.319 (-1)
1.83	2.816 (-1)	3.626 (-1)	5.285 (-1)	6.939 (-1)
1.11 (+0)	3.026 (-1)	5.329 (-1)	5.611 (-1)	7.560 (-1)
5.50 (-1)	4.466 (-1)	6.876 (-1)	7.198 (-1)	8.098 (-1)
1.11 (-1)	4.582 (-1)	6.819 (-1)	7.980 (-1)	7.724 (-1)
2.18 (-2)	5.014 (-1)	6.626 (-1)	8.436 (-1)	7.369 (-1)
3.35 (-3)	4.957 (-1)	6.734 (-1)	8.616 (-1)	7.377 (-1)
5.83 (-4)	4.863 (-1)	6.606 (-1)	8.725 (-1)	7.242 (-1)
1.01 (-4)	4.407 (-1)	6.570 (-1)	8.777 (-1)	7.183 (-1)
2.90 (-5)	4.207 (-1)	6.555 (-1)	8.788 (-1)	7.145 (-1)
1.07 (-5)	4.162 (-1)	6.553 (-1)	8.799 (-1)	7.121 (-1)
3.06 (-6)	3.700 (-1)	6.557 (-1)	8.811 (-1)	7.100 (-1)
1.12 (-6)	3.617 (-1)	6.567 (-1)	8.823 (-1)	7.090 (-1)
4.14 (-7)	4.153 (-1)	6.765 (-1)	8.931 (-1)	7.246 (-1)
[Gamma Rays]				
1.00 (+1)	0.0	0.0	3.226 (-3)	1.833 (-3)
8.00 (+0)	0.0	0.0	3.608 (-3)	1.972 (-3)
6.00	0.0	0.0	3.660 (-3)	1.965 (-3)
5.00	0.0	0.0	3.822 (-3)	2.053 (-3)
4.00	0.0	0.0	4.062 (-3)	2.745 (-3)
3.00	0.0	0.0	3.853 (-3)	2.143 (-3)
2.50	0.0	0.0	3.847 (-3)	2.196 (-3)
2.00	0.0	0.0	3.885 (-3)	2.297 (-3)
1.50	0.0	0.0	4.405 (-3)	2.595 (-3)
1.00 (+0)	0.0	0.0	6.093 (-3)	3.163 (-3)
7.00 (-1)	0.0	0.0	1.313 (-2)	5.543 (-3)
4.50	0.0	0.0	4.818 (-2)	2.679 (-2)
3.00	0.0	0.0	8.184 (-2)	8.830 (-2)
1.50	0.0	0.0	9.720 (-2)	5.896 (-2)
1.00 (-1)	0.0	0.0	1.510 (-1)	9.769 (-2)
7.00 (-2)	0.0	0.0	2.501 (-1)	5.877 (-2)
4.50	0.0	0.0	1.957 (-1)	1.475 (-2)
3.00	0.0	0.0	9.647 (-2)	2.314 (-3)
2.00 (-2)	0.0	0.0	1.073 (-2)	1.130 (-4)

Multigroup discrete ordinates solutions to the adjoint transport equation are obtained by inverting energy dependent input data with respect to energy, including the group-to-group transfer probabilities of the cross sections. (Of course, meaningful results are obtained only with appropriate source and boundary terms.) In order to calculate the source importance distribution for a neutron dose detector, particles are transported from a thermal energy upward into higher energy groups. The mean free path of a thermal neutron in 1.11 mg/cm^3 air is approximately 22 meters. Since there are no scattering transfers into the group, the flux or importance is greatly degraded with distance. Even though the uncollided component is calculated analytically, the multiple within group scattering and the upscattering to other groups is determined by iteration within the code. Lack of convergence and negative fluences were a major problem. Since the lowest energy group is the first group in an adjoint problem and for this problem is important in contributing to the transport process, it appears that an adequate mesh would be about 10 meters or less. This kind of mesh requirement coupled with numerical difficulties resulted in an alternate approach being taken.

To minimize problems with starting with a thermal neutron source, a scheme was used to calculate the importance due to both neutrons and gamma rays and to gamma rays alone. By taking the difference in the two sets of results, importance distributions were obtained for neutrons. These results were then validated by calculating the results for neutrons only using a fine mesh but limiting the size of the problem to a 600 by 600 meter grid. There was good agreement between the results obtained with the two methods. However, due to numerical difficulties and "noise" in the results due to the iteration procedure, results for low energies at very deep penetration were meaningless and were set to zero.

4.1.4 Angular Quadrature

An S_8 symmetric angular quadrature consisting of 48 angles was used together with a P_3 legendre expansion of the multigroup scattering cross sections. Results obtained with this quadrature indicated severe oscillations as a function of position. These oscillations were a factor of two or more and therefore resulted in a degradation in quality of the results. Previous calculations also indicated this type of oscillation but detailed results were not published.

To reduce the severity of this effect, each problem was restarted for one inner iteration per group using an asymmetric quadrature consisting of 104 angles. (An S_{16} quadrature was used in the upward direction with the S_8 quadrature in the downward direction.) This approach reduced the oscillations to a 10-30% effect for some energy groups and removed them altogether for other groups. It should be noted that the most severe oscillations occurred for those energy groups having a very low dominance ratio, i.e., the within group scattering is small and in general the mean free path is large. Some effects of the discrete angles still exist in the results but they have been significantly reduced.

Figure 8 shows results for two neutron groups when 48 and 104 angles are used. The use of 104 angles significantly reduces the oscillations in the results but also appears to reduce the overall intensity. Figure 9 shows a somewhat worst case for gamma rays. Attempts were initially made to resolve the problem with an S_{10} quadrature (70 angles) but the results were still not adequate. As noted in Figure 9, the use of 104 angles removed the major oscillations. All of the data base source energy importance

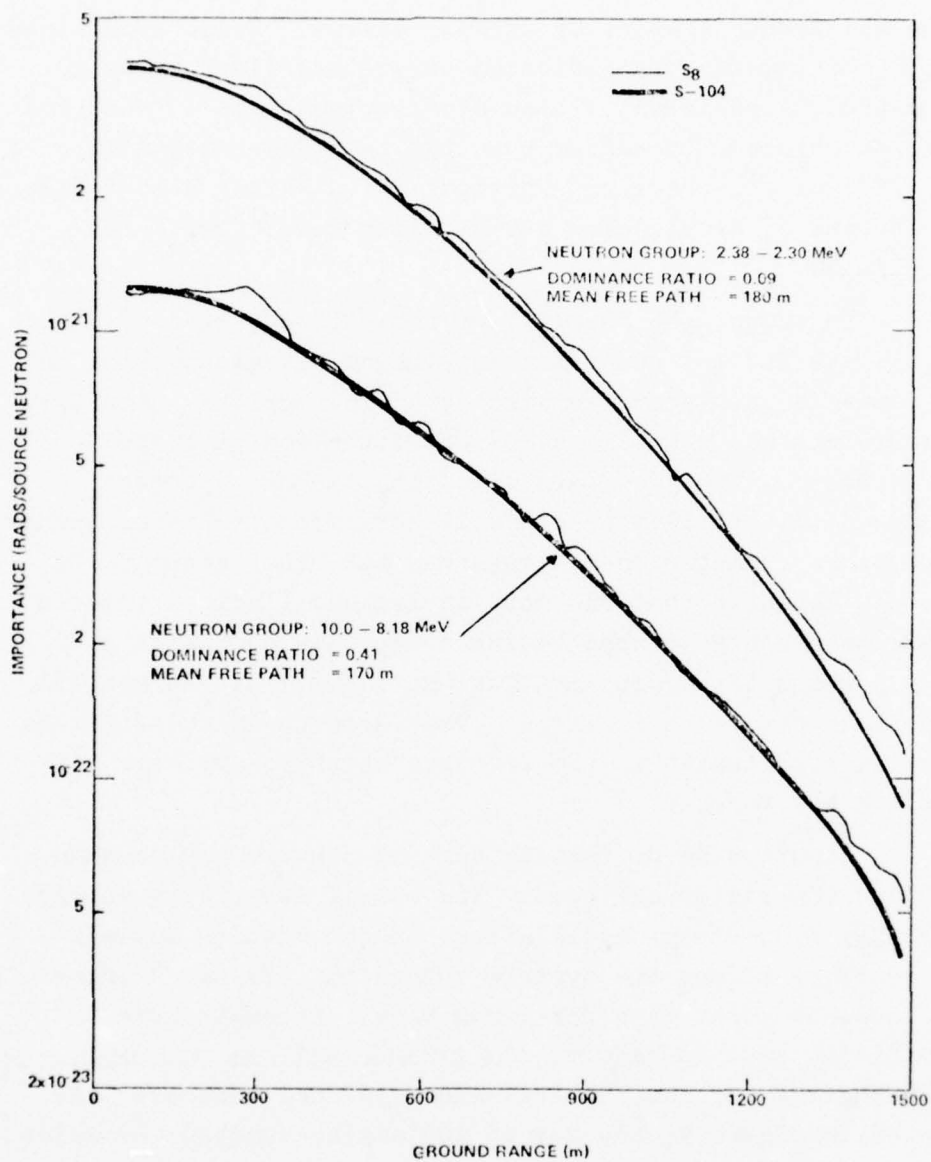


Figure 8. Free-field secondary gamma ray dose source importance versus ground range for a source 1100 m above ground.

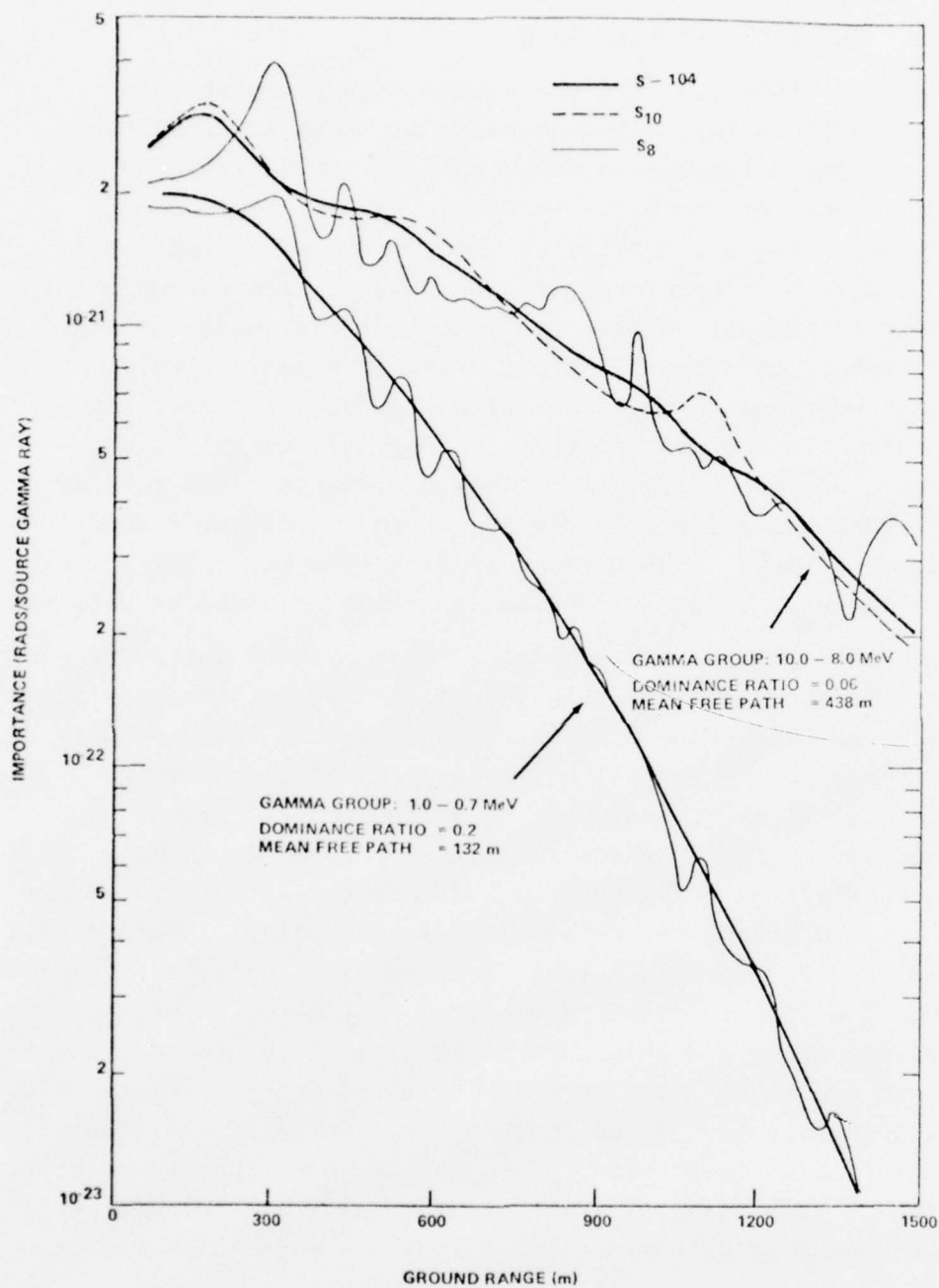


Figure 9. Free-field gamma ray dose source importance versus ground range for a source 1100 m above ground.

distributions were determined by performing at least one iteration with 104 angles.

4.2 DELAYED DOSE DATA BASE

The IDEA code and the source energy importance distributions for uniform density air were utilized to obtain the delayed dose components of the data base. A 300.0 meter ground elevation above sea level was chosen for which the air density at the surface is approximately 1.19 mg/cm^3 . Therefore, the data base source energy importance distributions were rho-R scaled from an air density of 1.11 mg/cm^3 to 1.19 mg/cm^3 . The IDEA code calculates the prompt and delayed radiation from one or more weapon bursts. In the transport of the delayed radiation, the rising and expanding fireball is considered. The varying air mass thickness from the source to the detector due to the shock wave is determined at each time step with rho-R scaling used to determine the radiation dose at the detector.

The delayed neutron and fission product gamma ray source spectra are given in Table 13. These two spectra were folded with the importance distributions to obtain the dose/unit source particle for all burst heights and ground ranges. The eleven dose quantities were converted to $4\pi R^2$ values as a function of rho-R, where rho-R is the slant range mass thickness of air as measured from a detector located 1.75 meters above the ground to all possible source points. This matrix was then utilized in a table look-up as illustrated in Figure 10. The figure depicts a detector configuration at time t seconds after a weapon burst. At time $T=0.0$ seconds, a weapon burst occurs at a distance H_B above the ground. As the blast phenomenon is treated in IDEA, the fireball (the delayed radiation source) rises to a point H_S above the ground at time t . The mass thickness of air, ρR_S , from the source to the ground is determined as well as the mass thickness of air

Table 13. Delayed neutron and fission product gamma ray source spectra.

Energy Interval (MeV)	Neutrons/Group	Energy Interval (MeV)	Gamma Rays/Group
1.83 - 1.11	0.085	5.0 - 4.0	0.0054
1.11 - 0.55	0.334	4.0 - 3.0	0.0182
0.55 - 0.111	0.496	3.0 - 2.5	0.0218
0.111 - 0.0218	0.0797	2.5 - 2.0	0.0401
0.0218 - 0.00335	0.0023	2.0 - 1.5	0.0742
0.00335 - 0.000583	0.003	1.5 - 1.0	0.133
		1.0 - 0.7	0.141
		0.7 - 0.45	0.159
		0.45 - 0.30	0.114
		0.30 - 0.15	0.157
		0.15 - 0.10	0.0429
		0.10 - 0.07	0.0411
		0.07 - 0.045	0.0532

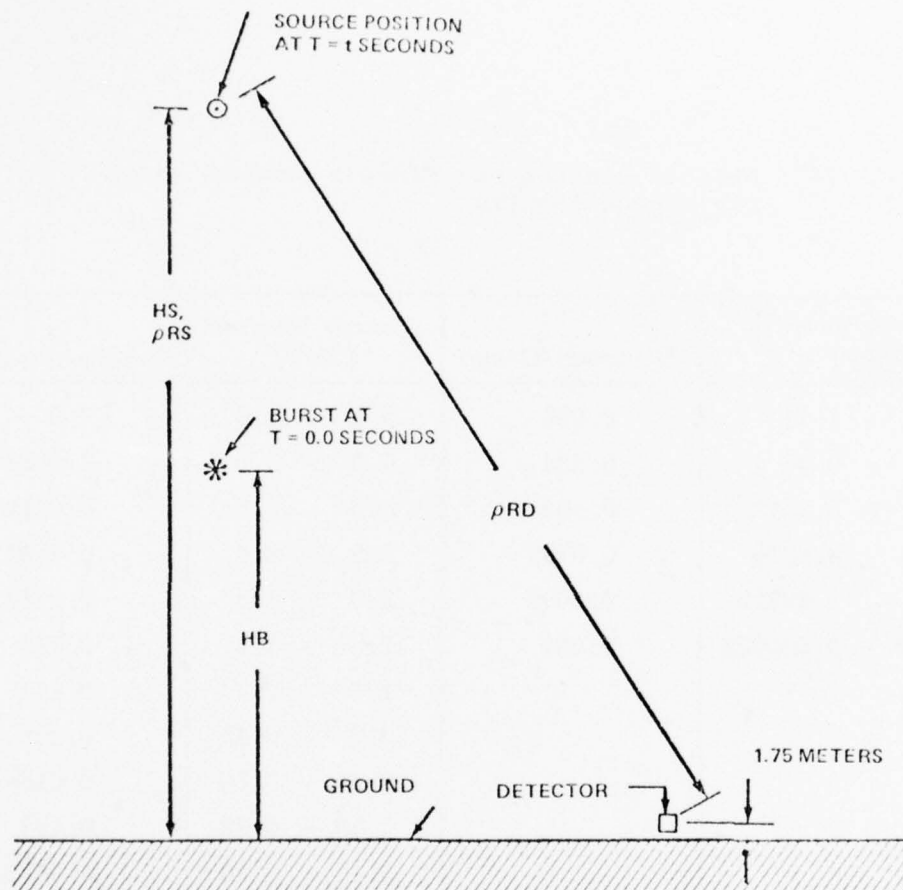


Figure 10. Source and detector configuration for calculation of delayed dose rate.

between the source and detector, ρ_{RD} . The matrix of $4\pi R^2$ dose versus rho-R is then interrogated using these values to determine the dose at the detector. The dose is then multiplied by the appropriate source intensity and divided by the integration time step interval. The total integration time is determined to be the time at which the maximum dose rate for all detector responses has fallen by at least a factor of 50. This procedure was used for all of the dose quantities for all of the burst height-blast yield combinations of interest.

The blast yields calculated range from 0.01 KT to 100.00 KT in powers of 10 with additional ones at 30 and 500 KT. The height of burst for which these six yields were calculated are 13, 28, 60, 129, 278 and 476 meters. In addition, each yield was calculated at 1 meter (surface burst) and at 1000 meters. Thus, a total of 48 blast yield-burst height combinations were calculated. Since the delayed dose scales directly with the fission yield for a given blast yield, the data base was generated for unity fission/blast yield ratios. The resulting integrated doses for each of the eleven detector responses for the above blast-burst combinations form the delayed dose data base.

5. RESULTS

The results of adjoint calculations are the energy and space dependent importance distribution which may be interpreted as the contribution to the dose of a neutron or gamma ray source with a given energy placed at a given range and height above the ground. This data may be used with any source spectrum at any height to determine the dose at given range. Also, the data may be used to determine the relative importance as a function of energy of a source spectrum. Separate data are required for each type of response function.

Source energy importance distributions as a function of ground range for seven source heights (or heights of burst) for the free-field and armor shielded detectors are presented in Tables 14 through 41. For each height of burst and detector, the importance of a source particle in contributing to the prompt neutron and gamma ray tissue dose is given.

Data in Tables 14 through 41 can be used to determine the component of the dose due to different source energy spectra. For example, in Table 14 for a ground range of 400 meters it is noted that the importance is approximately constant for energies greater than 2.38 MeV. This means that the neutron dose is not sensitive to the shape of the source weapon spectrum for neutron energies above 2.38 MeV. It is also noted that for neutrons with energies less than 20 keV, the importance is a factor of 500 less than it is for a high energy neutron. Detailed analysis of the importances can indicate the variations in dose at a given range that result from different source spectra. For example, Table 14 would be used for the free-field neutron dose component for a burst height of 1 meter and Table 15 would be used for the free-field secondary gamma ray and prompt gamma ray component. Similar

Table 14. Free-field neutron tissue dose source energy importance vs. ground range for a burst height of 1.00 meter.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	2.08E-17	4.74E-18	9.56E-19	3.11E-19	1.21E-19	5.16E-20	2.35E-20	5.67E-21	1.61E-21	5.09E-22
1.22E+01 - 1.00E+01	1.98E-17	4.60E-18	9.46E-19	3.11E-19	1.22E-19	5.23E-20	2.39E-20	5.76E-21	1.61E-21	4.99E-22
1.00E+01 - 8.18E+00	1.90E-17	4.54E-18	9.64E-19	3.24E-19	1.29E-19	5.64E-20	2.62E-20	6.49E-21	1.86E-21	5.89E-22
8.18E+00 - 6.37E+00	1.85E-17	4.45E-18	9.47E-19	3.19E-19	1.28E-19	5.65E-20	2.68E-20	7.05E-21	2.19E-21	7.60E-22
6.37E+00 - 4.96E+00	1.83E-17	4.34E-18	9.16E-19	3.10E-19	1.27E-19	5.76E-20	2.83E-20	8.08E-21	2.73E-21	1.04E-21
4.96E+00 - 4.06E+00	1.72E-17	4.07E-18	8.49E-19	2.83E-19	1.13E-19	4.98E-20	2.37E-20	6.27E-21	1.95E-21	6.79E-22
4.06E+00 - 3.01E+00	1.75E-17	4.24E-18	8.79E-19	2.86E-19	1.11E-19	4.78E-20	2.21E-20	5.49E-21	1.60E-21	5.21E-22
3.01E+00 - 2.38E+00	1.63E-17	4.28E-18	9.55E-19	3.18E-19	1.24E-19	5.25E-20	2.36E-20	5.39E-21	1.39E-21	3.90E-22
2.38E+00 - 2.30E+00	1.44E-17	3.92E-18	9.15E-19	3.14E-19	1.24E-19	5.31E-20	2.38E-20	5.29E-21	1.28E-21	3.27E-22
2.30E+00 - 1.83E+00	1.60E-17	4.24E-18	8.83E-19	2.71E-19	9.79E-20	3.89E-20	1.64E-20	3.31E-21	7.56E-22	1.82E-22
1.83E+00 - 1.11E+00	1.49E-17	3.75E-18	7.10E-19	2.04E-19	7.05E-20	2.71E-20	1.12E-20	2.15E-21	4.76E-22	1.09E-22
1.11E+00 - 5.50E-01	1.20E-17	2.91E-18	5.15E-19	1.42E-19	4.70E-20	1.76E-20	6.95E-21	1.21E-21	2.27E-22	3.99E-23
5.50E-01 - 1.11E-01	7.95E-18	1.74E-18	2.61E-19	6.51E-20	2.03E-20	7.14E-21	2.59E-21	3.30E-22	2.80E-23	0.00E-01
1.11E-01 - 2.18E-02	3.38E-18	6.67E-19	8.23E-20	1.76E-20	4.55E-21	1.28E-21	2.53E-22	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	1.74E-18	3.05E-19	2.66E-20	2.58E-21	3.74E-22	6.59E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	1.69E-19	2.02E-20	1.83E-21	2.68E-22	4.36E-23	7.99E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	4.25E-20	9.74E-21	1.07E-21	1.41E-22	2.03E-23	2.99E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	3.50E-20	8.07E-21	7.62E-22	8.39E-23	9.53E-24	1.11E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	3.71E-20	7.74E-21	5.85E-22	5.57E-23	5.00E-24	4.77E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	3.99E-20	7.39E-21	4.80E-22	3.53E-23	2.74E-24	2.30E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	4.34E-20	6.61E-21	3.09E-22	1.80E-23	9.82E-25	6.70E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	4.41E-20	5.86E-21	2.22E-22	8.73E-24	4.09E-25	2.14E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	4.21E-20	4.37E-21	1.15E-22	4.02E-24	1.57E-25	6.60E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 15. Free-field gamma tissue dose source energy importance vs. ground range for a burst height of 1.00 meter.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	8.59E-19	2.97E-19	9.29E-20	3.98E-20	1.93E-20	1.00E-20	5.49E-21	1.81E-21	6.49E-22	2.46E-22
1.22E+01 - 1.00E+01	8.62E-19	2.99E-19	9.38E-20	4.03E-20	1.95E-20	1.02E-20	5.58E-21	1.84E-21	6.61E-22	2.50E-22
1.00E+01 - 8.18E+00	7.50E-19	2.62E-19	8.36E-20	3.63E-20	1.78E-20	9.36E-21	5.16E-21	1.71E-21	6.15E-22	2.32E-22
8.18E+00 - 6.37E+00	5.47E-19	1.94E-19	6.10E-20	2.60E-20	1.25E-20	6.43E-21	3.47E-21	1.11E-21	3.81E-22	1.38E-22
6.37E+00 - 4.96E+00	3.21E-19	1.14E-19	3.57E-20	1.51E-20	7.22E-21	3.69E-21	1.97E-21	6.10E-22	2.04E-22	7.20E-23
4.96E+00 - 4.06E+00	2.32E-19	8.30E-20	2.58E-20	1.10E-20	5.26E-21	2.70E-21	1.44E-21	4.50E-22	1.51E-22	5.32E-23
4.06E+00 - 3.01E+00	2.16E-19	8.05E-20	2.50E-20	1.10E-20	5.37E-21	2.78E-21	1.50E-21	4.69E-22	1.57E-22	5.53E-23
3.01E+00 - 2.38E+00	1.90E-19	7.50E-20	2.60E-20	1.18E-20	5.97E-21	3.17E-21	1.73E-21	5.53E-22	1.86E-22	6.57E-23
2.38E+00 - 2.30E+00	1.86E-19	7.48E-20	2.64E-20	1.22E-20	6.19E-21	3.30E-21	1.81E-21	5.75E-22	1.93E-22	6.77E-23
2.30E+00 - 1.83E+00	1.82E-19	7.82E-20	2.63E-20	1.32E-20	6.61E-21	3.45E-21	1.84E-21	5.61E-22	1.81E-22	6.26E-23
1.83E+00 - 1.11E+00	1.88E-19	8.45E-20	3.08E-20	1.40E-20	6.80E-21	3.44E-21	1.78E-21	5.15E-22	1.62E-22	5.56E-23
1.11E+00 - 5.50E-01	2.11E-19	9.74E-20	3.49E-20	1.51E-20	7.02E-21	3.38E-21	1.68E-21	4.60E-22	1.42E-22	4.93E-23
5.50E-01 - 1.11E-01	2.88E-19	1.28E-19	4.03E-20	1.54E-20	6.35E-21	2.78E-21	1.29E-21	3.34E-22	1.03E-22	3.82E-23
1.11E-01 - 2.18E-02	3.98E-19	1.57E-19	4.64E-20	1.32E-20	4.85E-21	1.99E-21	9.46E-22	2.46E-22	8.30E-23	3.13E-23
2.18E-02 - 3.35E-03	4.87E-19	1.73E-19	3.77E-20	1.11E-20	3.65E-21	1.59E-21	7.48E-22	2.16E-22	7.48E-23	2.63E-23
3.35E-03 - 3.83E-04	5.54E-19	1.82E-19	3.46E-20	9.42E-21	3.25E-21	1.38E-21	6.73E-22	2.03E-22	7.10E-23	2.69E-23
5.83E-04 - 1.01E-04	6.20E-19	1.87E-19	3.19E-20	8.28E-21	2.94E-21	1.30E-21	6.49E-22	1.99E-22	6.93E-23	2.64E-23
1.01E-04 - 2.90E-05	6.84E-19	1.88E-19	2.93E-20	7.53E-21	2.77E-21	1.27E-21	6.43E-22	1.98E-22	6.93E-23	2.64E-23
2.90E-05 - 1.07E-05	7.29E-19	1.87E-19	2.71E-20	7.08E-21	2.70E-21	1.26E-21	6.44E-22	1.99E-22	6.97E-23	2.66E-23
1.07E-05 - 3.06E-06	7.69E-19	1.80E-19	2.48E-20	6.71E-21	2.66E-21	1.25E-21	6.43E-22	1.99E-22	6.99E-23	2.69E-23
3.06E-06 - 1.12E-06	8.04E-19	1.73E-19	2.26E-20	6.51E-21	2.67E-21	1.27E-21	6.55E-22	2.02E-22	7.15E-23	2.76E-23
1.12E-06 - 4.14E-07	8.16E-19	1.60E-19	2.11E-20	6.46E-21	2.71E-21	1.29E-21	6.67E-22	2.06E-22	7.35E-23	2.86E-23
4.14E-07 - 1.00E-07	7.96E-19	1.41E-19	2.03E-20	6.60E-21	2.80E-21	1.35E-21	6.95E-22	2.18E-22	7.80E-23	3.05E-23
GAMMA ENERGY GROUP (MEV)	GROUND RANGE (METERS)									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01 - 8.00E+00	7.45E-18	1.61E-18	3.26E-19	1.17E-19	5.31E-20	2.73E-20	1.52E-20	5.45E-21	2.21E-21	9.72E-22
8.00E+00 - 6.00E+00	5.95E-18	1.27E-18	2.51E-19	8.81E-20	3.89E-20	1.94E-20	1.05E-20	3.55E-21	1.36E-21	5.59E-22
6.00E+00 - 5.00E+00	5.54E-18	1.17E-18	2.23E-19	7.71E-20	3.31E-20	1.61E-20	8.47E-21	2.71E-21	9.00E-22	3.81E-22
5.00E+00 - 4.00E+00	4.73E-18	9.92E-19	1.87E-19	6.24E-20	2.62E-20	1.24E-20	6.55E-21	1.92E-21	6.57E-22	2.42E-22
4.00E+00 - 3.00E+00	3.74E-18	7.74E-19	1.42E-19	4.60E-20	1.87E-20	8.54E-21	4.32E-21	1.18E-21	3.74E-22	1.27E-22
3.00E+00 - 2.50E+00	3.00E-18	6.14E-19	1.09E-19	3.44E-20	1.35E-20	5.95E-21	2.82E-21	7.29E-22	2.11E-22	6.55E-23
2.50E+00 - 2.00E+00	2.52E-18	5.11E-19	8.80E-20	2.71E-20	1.03E-20	4.38E-21	2.01E-21	4.80E-22	1.28E-22	3.65E-23
2.00E+00 - 1.50E+00	2.01E-18	4.04E-19	6.80E-20	2.00E-20	7.26E-21	2.95E-21	1.29E-21	2.78E-22	6.65E-23	1.69E-23
1.50E+00 - 1.00E+00	1.59E-18	3.14E-19	5.92E-20	1.39E-20	4.72E-21	1.79E-21	7.22E-22	1.33E-22	2.72E-23	5.92E-24
1.00E+00 - 7.00E-01	1.15E-18	2.23E-19	3.41E-20	8.82E-21	2.77E-21	9.63E-22	3.54E-22	5.36E-23	8.81E-24	1.52E-24
7.00E-01 - 4.50E-01	8.26E-19	1.59E-19	2.34E-20	5.66E-21	1.64E-21	5.22E-22	1.75E-22	2.17E-23	2.91E-24	4.11E-25
4.50E-01 - 3.00E-01	5.83E-19	1.12E-19	1.56E-20	3.50E-21	9.25E-22	2.65E-22	7.95E-23	7.82E-24	8.27E-25	9.00E-26
3.00E-01 - 1.50E-01	3.36E-19	6.72E-20	9.19E-21	1.92E-21	4.69E-22	3.16E-23	3.34E-23	7.22E-24	2.41E-25	2.23E-26
1.50E-01 - 7.00E-02	2.12E-19	4.03E-20	4.59E-21	7.81E-22	1.52E-22	3.16E-23	6.46E-24	3.46E-25	1.85E-26	1.03E-27
7.00E-02 - 4.50E-02	1.46E-19	2.73E-20	2.70E-21	3.94E-22	6.60E-23	1.20E-23	2.26E-24	8.79E-26	3.68E-27	1.60E-28
4.50E-02 - 3.00E-02	1.43E-19	2.20E-20	1.59E-21	1.76E-22	2.41E-23	3.59E-24	5.72E-25	1.67E-26	3.52E-28	2.40E-29
3.00E-02 - 2.00E-02	1.40E-19	1.40E-20	4.35E-22	2.15E-23	1.37E-24	9.38E-26	6.95E-27	4.47E-29	3.19E-31	2.46E-33
2.00E-02 - 1.00E-02	4.86E-20	1.70E-21	6.13E-24	3.68E-26	2.66E-28	2.26E-30	2.10E-32	2.04E-36	2.18E-39	1.58E-39
1.00E-02 - 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 16. Armor shielded neutron tissue dose source energy importance
vs. ground range for a burst height of 1.00 meter.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	1.46E-17	3.50E-18	7.42E-19	2.44E-19	9.37E-20	3.89E-20	1.71E-20	3.72E-21	9.38E-22	2.67E-22
1.22E+01 - 1.00E+01	1.38E-17	3.37E-18	7.29E-19	2.43E-19	9.39E-20	3.93E-20	1.74E-20	3.82E-21	9.69E-22	2.69E-22
1.00E+01 - 8.18E+00	1.35E-17	3.38E-18	7.48E-19	2.53E-19	9.96E-20	4.25E-20	1.91E-20	4.33E-21	1.12E-21	3.20E-22
8.18E+00 - 6.37E+00	1.30E-17	3.31E-18	7.40E-19	2.51E-19	9.87E-20	4.22E-20	1.91E-20	4.44E-21	1.21E-21	3.73E-22
6.37E+00 - 4.96E+00	1.32E-17	3.35E-18	7.47E-19	2.52E-19	9.91E-20	4.24E-20	1.93E-20	4.67E-21	1.35E-21	4.54E-22
4.96E+00 - 4.06E+00	1.24E-17	3.21E-18	7.14E-19	2.36E-19	8.99E-20	3.71E-20	1.63E-20	3.63E-21	9.63E-22	2.95E-22
4.06E+00 - 3.01E+00	1.34E-17	3.55E-18	7.69E-19	2.43E-19	8.83E-20	3.50E-20	1.48E-20	3.69E-21	7.72E-22	2.24E-22
3.01E+00 - 2.38E+00	1.33E-17	3.72E-18	8.34E-19	2.66E-19	9.68E-20	3.62E-20	1.60E-20	3.16E-21	7.20E-22	1.83E-22
2.38E+00 - 2.30E+00	1.19E-17	3.36E-18	7.79E-19	2.56E-19	9.55E-20	3.84E-20	1.62E-20	3.23E-21	7.14E-22	1.71E-22
2.30E+00 - 1.83E+00	1.38E-17	3.81E-18	7.59E-19	2.13E-19	6.99E-20	2.52E-20	9.74E-21	1.72E-21	3.59E-22	8.53E-23
1.83E+00 - 1.11E+00	1.35E-17	3.47E-18	5.93E-19	1.49E-19	4.54E-20	1.56E-20	5.92E-21	1.04E-21	2.23E-22	5.60E-23
1.11E+00 - 5.50E-01	1.15E-17	2.69E-18	4.03E-19	9.60E-20	2.84E-20	9.69E-21	3.61E-21	6.18E-22	1.31E-22	3.30E-23
5.50E-01 - 1.11E-01	6.94E-18	1.38E-18	1.67E-19	3.60E-20	1.03E-20	3.48E-21	1.30E-21	2.31E-22	5.01E-23	1.30E-23
1.11E-01 - 2.18E-02	2.21E-18	4.88E-19	5.59E-20	9.47E-21	1.62E-21	4.06E-22	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	1.38E-18	2.37E-19	1.51E-20	1.84E-21	2.44E-22	4.23E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	4.19E-20	6.78E-21	4.56E-22	5.31E-23	6.86E-24	1.03E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	9.69E-21	1.73E-21	1.44E-22	1.57E-23	1.91E-24	2.48E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	6.08E-21	1.12E-21	7.59E-23	6.72E-24	6.18E-25	6.66E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	5.61E-21	9.04E-22	4.60E-23	3.47E-24	2.58E-25	2.20E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	4.58E-21	6.41E-22	2.80E-23	1.67E-24	1.09E-25	8.02E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	3.11E-21	3.84E-22	1.26E-23	5.02E-25	2.49E-26	1.36E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	1.71E-21	1.78E-22	5.07E-24	1.70E-25	6.75E-27	3.55E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	5.10E-22	5.29E-23	1.38E-24	4.72E-26	1.90E-27	8.79E-29	0.00E-01	0.00E-01	0.00E-01	0.00E-01

IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND

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Table 18. Free-field neutron tissue dose source energy importance vs. ground range for a burst height of 13.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	2.37E-17	5.75E-18	1.10E-18	3.43E-19	1.31E-19	5.55E-20	2.53E-20	6.11E-21	1.73E-21	5.51E-22
1.22E+01 - 1.00E+01	2.25E-17	5.52E-18	1.08E-18	3.42E-19	1.31E-19	5.62E-20	2.57E-20	6.20E-21	1.74E-21	5.41E-22
1.00E+01 - 8.18E+00	2.17E-17	5.42E-18	1.09E-18	3.34E-19	1.38E-19	6.01E-20	2.79E-20	6.91E-21	1.99E-21	6.33E-22
8.18E+00 - 6.37E+00	2.16E-17	5.38E-18	1.08E-18	3.38E-19	1.37E-19	6.03E-20	2.86E-20	7.55E-21	2.35E-21	8.21E-22
6.37E+00 - 4.96E+00	2.22E-17	5.41E-18	1.06E-18	3.45E-19	1.39E-19	6.29E-20	3.09E-20	8.89E-21	3.03E-21	1.15E-21
4.96E+00 - 4.06E+00	2.08E-17	5.05E-18	9.81E-19	3.15E-19	1.24E-19	5.47E-20	2.60E-20	6.93E-21	2.17E-21	7.58E-22
4.06E+00 - 3.01E+00	2.16E-17	5.29E-18	1.03E-18	3.27E-19	1.26E-19	5.42E-20	2.51E-20	6.26E-21	1.83E-21	5.95E-22
3.01E+00 - 2.38E+00	1.99E-17	5.25E-18	1.10E-18	3.56E-19	1.37E-19	5.76E-20	2.58E-20	5.90E-21	1.52E-21	4.29E-22
2.38E+00 - 2.30E+00	1.73E-17	4.72E-18	1.04E-18	3.44E-19	1.34E-19	5.66E-20	2.53E-20	5.66E-21	1.36E-21	3.46E-22
2.30E+00 - 1.83E+00	2.00E-17	5.21E-18	1.02E-18	3.92E-19	1.03E-19	4.26E-20	1.80E-20	3.66E-21	8.37E-22	2.03E-22
1.83E+00 - 1.11E+00	1.97E-17	4.80E-18	8.36E-19	2.33E-19	7.97E-20	3.06E-20	1.26E-20	2.47E-21	5.42E-22	1.25E-22
1.11E+00 - 5.56E-01	1.63E-17	3.78E-18	6.12E-19	1.63E-19	5.36E-20	1.98E-20	7.85E-21	1.39E-21	2.62E-22	4.63E-23
5.56E-01 - 1.11E-01	1.10E-17	2.31E-18	3.21E-19	7.83E-20	2.42E-20	8.36E-21	3.06E-21	4.25E-22	4.31E-23	0.00E-01
1.11E-01 - 2.18E-02	4.75E-18	9.04E-19	1.07E-19	2.36E-20	5.90E-21	1.62E-21	3.81E-22	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	2.12E-18	3.52E-19	2.55E-20	3.07E-21	4.50E-22	8.15E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	1.27E-19	2.35E-20	2.19E-21	3.19E-22	5.20E-23	9.63E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	4.53E-20	1.05E-20	1.22E-21	1.71E-22	2.46E-23	3.76E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	3.63E-20	8.99E-21	9.16E-22	1.05E-22	1.20E-23	1.41E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	3.94E-20	8.87E-21	7.23E-22	6.82E-23	6.35E-24	6.31E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	4.32E-20	8.66E-21	5.73E-22	4.37E-23	3.47E-24	2.93E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	4.77E-20	7.90E-21	3.60E-22	2.18E-23	1.29E-24	8.38E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	4.92E-20	6.77E-21	2.52E-22	1.03E-23	5.06E-25	2.69E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	4.54E-20	4.70E-21	1.29E-22	4.51E-24	1.79E-25	7.82E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 19. Free-field gamma tissue dose source energy importance
vs. ground range for a burst height of 13.00 meters.

NEUTRON ENERGY GROUP (MEV)		IMPORTANCE (RADS/SOURCE PARTICLE/ROUP) AT 1.75 METERS ABOVE GROUND									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01	1.22E+01	1.53E-18	4.19E-19	1.07E-19	4.35E-20	2.08E-20	1.08E-20	5.89E-21	1.94E-21	6.96E-22	2.64E-22
1.22E+01	1.00E+01	1.53E-18	4.23E-19	1.09E-19	4.40E-20	2.11E-20	1.09E-20	5.98E-21	1.97E-21	7.07E-22	2.68E-22
1.00E+01	8.18E+00	1.34E-18	3.76E-19	9.75E-20	3.97E-20	1.91E-20	9.98E-21	5.49E-21	1.82E-21	6.54E-22	2.47E-22
8.18E+00	6.37E+00	9.59E-19	2.70E-19	7.00E-20	2.81E-20	1.33E-20	6.80E-21	3.66E-21	1.16E-21	4.01E-22	1.46E-22
6.37E+00	4.96E+00	5.63E-19	1.54E-19	3.96E-20	1.50E-20	7.44E-21	3.79E-21	2.02E-21	6.27E-22	2.10E-22	7.39E-23
4.96E+00	4.06E+00	3.89E-19	1.05E-19	2.74E-20	1.11E-20	5.35E-21	2.70E-21	1.45E-21	4.54E-22	1.52E-22	5.37E-23
4.06E+00	3.01E+00	3.21E-19	9.29E-20	2.61E-20	1.10E-20	5.25E-21	2.78E-21	1.51E-21	4.75E-22	1.59E-22	5.62E-23
3.01E+00	2.79E-19	8.74E-20	2.70E-20	2.70E-20	1.21E-20	6.07E-21	3.23E-21	1.78E-21	5.68E-22	1.92E-22	6.76E-23
2.79E-19	2.65E-19	8.64E-20	2.77E-20	2.77E-20	1.26E-20	6.37E-21	3.40E-21	1.87E-21	5.96E-22	2.00E-22	7.00E-23
2.65E-19	2.38E+00	8.44E-20	2.93E-20	2.93E-20	1.33E-20	6.77E-21	3.55E-21	1.90E-21	5.80E-22	1.88E-22	6.46E-23
2.38E+00	2.09E-19	8.71E-20	3.14E-20	3.14E-20	1.43E-20	7.00E-21	3.56E-21	1.85E-21	5.35E-22	1.68E-22	5.76E-23
2.09E-19	2.22E-19	9.94E-20	3.58E-20	3.58E-20	1.56E-20	7.26E-21	3.51E-21	1.75E-21	4.70E-22	1.48E-22	5.10E-23
2.22E-19	2.94E-19	1.30E-19	4.17E-20	4.17E-20	1.60E-20	6.65E-21	2.91E-21	1.35E-21	3.48E-22	1.09E-22	3.97E-23
2.94E-19	4.06E-19	1.62E-19	4.29E-20	4.29E-20	1.41E-20	5.19E-21	2.12E-21	9.61E-22	2.58E-22	8.71E-23	3.30E-23
4.06E-19	5.00E-19	1.82E-19	4.09E-20	4.09E-20	1.21E-20	4.19E-21	1.70E-21	7.97E-22	2.29E-22	7.95E-23	3.02E-23
5.00E-19	5.70E-19	1.93E-19	3.77E-20	3.77E-20	1.02E-20	3.48E-21	1.46E-21	7.08E-22	2.13E-22	7.45E-23	2.83E-23
5.70E-19	6.46E-19	2.02E-19	3.50E-20	3.50E-20	9.00E-21	3.13E-21	1.36E-21	6.81E-22	2.09E-22	7.31E-23	2.78E-23
6.46E-19	7.22E-19	2.07E-19	3.21E-20	3.21E-20	8.16E-21	2.93E-21	1.33E-21	6.74E-22	2.08E-22	7.27E-23	2.77E-23
7.22E-19	7.82E-19	2.08E-19	2.98E-20	2.98E-20	7.63E-21	2.87E-21	1.33E-21	6.82E-22	2.10E-22	7.36E-23	2.83E-23
7.82E-19	8.30E-19	2.00E-19	2.67E-20	2.67E-20	7.06E-21	2.76E-21	1.30E-21	6.66E-22	2.06E-22	7.24E-23	2.78E-23
8.30E-19	8.82E-19	1.92E-19	2.41E-20	2.41E-20	6.80E-21	2.77E-21	1.31E-21	6.76E-22	2.08E-22	7.37E-23	2.85E-23
8.82E-19	9.07E-19	1.77E-19	2.22E-20	2.22E-20	6.68E-21	2.78E-21	1.32E-21	6.79E-22	2.11E-22	7.48E-23	2.91E-23
9.07E-19	4.14E-07	1.54E-19	2.10E-20	2.10E-20	6.70E-21	2.81E-21	1.34E-21	6.91E-22	2.16E-22	7.74E-23	3.03E-23
4.14E-07											
GAMA ENERGY GROUP (MEV)		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01	8.00E+00	7.25E-18	1.72E-18	3.45E-19	1.21E-19	5.43E-20	2.77E-20	1.54E-20	5.49E-21	2.23E-21	9.78E-22
8.00E+00	6.00E+00	5.85E-18	1.38E-18	2.69E-19	9.20E-20	4.00E-20	1.98E-20	1.06E-20	3.59E-21	1.37E-21	5.63E-22
6.00E+00	5.00E+00	5.47E-18	1.27E-18	2.42E-19	8.07E-20	3.41E-20	1.64E-20	8.61E-21	2.74E-21	9.89E-22	3.84E-22
5.00E+00	4.00E+00	4.71E-18	1.08E-18	2.02E-19	6.56E-20	2.70E-20	1.27E-20	6.46E-21	1.95E-21	6.64E-22	2.44E-22
4.00E+00	3.00E+00	3.77E-18	8.56E-19	1.53E-19	4.87E-20	1.94E-20	8.78E-21	4.31E-21	1.20E-21	3.79E-22	1.29E-22
3.00E+00	2.50E+00	3.07E-18	6.86E-19	1.20E-19	3.66E-20	1.41E-20	6.13E-21	2.89E-21	7.43E-22	2.14E-22	6.63E-23
2.50E+00	2.00E+00	2.61E-18	5.77E-19	9.86E-20	2.90E-20	1.08E-20	4.53E-21	2.06E-21	4.90E-22	1.30E-22	3.71E-23
2.00E+00	1.50E+00	2.12E-18	4.62E-19	7.62E-20	2.15E-20	7.65E-21	3.07E-21	1.33E-21	2.65E-22	6.79E-23	1.72E-23
1.50E+00	1.00E+00	1.71E-18	3.62E-19	5.66E-20	1.50E-20	5.00E-21	1.87E-21	7.51E-22	1.38E-22	2.80E-23	6.06E-24
1.00E+00	0.50E+00	1.26E-18	2.61E-19	3.86E-20	9.61E-21	2.96E-21	1.01E-21	3.71E-22	5.38E-23	9.15E-24	1.58E-24
0.50E+00	0.25E+00	9.26E-19	1.89E-19	2.65E-20	6.19E-21	1.76E-21	5.56E-22	1.85E-22	2.29E-23	3.06E-24	4.31E-25
0.25E+00	0.125E+00	6.62E-19	1.33E-19	1.77E-20	3.04E-21	1.00E-21	8.55E-22	6.55E-23	8.39E-24	8.83E-25	9.69E-26
0.125E+00	0.0625E+00	3.97E-19	8.10E-20	1.05E-20	2.14E-21	5.15E-22	1.34E-22	3.66E-23	3.00E-24	2.64E-25	2.46E-26
0.0625E+00	0.03125E+00	2.49E-19	4.88E-20	5.53E-21	8.86E-22	1.71E-22	3.55E-23	7.71E-24	3.88E-25	2.07E-26	1.15E-27
0.03125E+00	0.015625E+00	1.76E-19	3.38E-20	3.21E-21	4.58E-22	7.64E-23	1.38E-23	2.60E-24	1.01E-25	4.22E-27	1.84E-28
0.015625E+00	0.0078125E+00	1.74E-19	2.78E-20	1.93E-21	2.14E-22	2.89E-23	4.32E-24	6.93E-25	2.04E-26	6.78E-28	2.46E-29
0.0078125E+00	0.00390625E+00	1.68E-19	1.74E-20	5.28E-22	2.66E-23	1.64E-24	1.13E-25	8.46E-27	5.51E-29	3.98E-31	3.08E-33
0.00390625E+00	0.001953125E+00	5.29E-20	1.90E-21	6.34E-24	3.94E-26	2.86E-28	2.47E-30	2.23E-32	2.18E-36	2.35E-39	1.63E-39
0.001953125E+00	0.0009765625E+00	6.00E-01	6.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 20. Armor shielded neutron tissue dose source energy importance
vs. ground range for a burst height of 13.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	1.67E-17	4.22E-18	8.49E-19	2.69E-19	1.01E-19	4.18E-20	1.83E-20	3.99E-21	1.01E-21	2.86E-22
1.22E+01 - 1.00E+01	1.57E-17	4.02E-18	8.28E-19	2.66E-19	1.01E-19	4.22E-20	1.86E-20	4.08E-21	1.03E-21	2.89E-22
1.00E+01 - 8.18E+00	1.55E-17	4.01E-18	8.45E-19	2.76E-19	1.07E-19	4.52E-20	2.02E-20	4.58E-21	1.19E-21	3.41E-22
8.18E+00 - 6.37E+00	1.52E-17	3.96E-18	8.38E-19	2.74E-19	1.06E-19	4.49E-20	2.02E-20	4.71E-21	1.29E-21	3.99E-22
6.37E+00 - 4.96E+00	1.57E-17	4.08E-18	8.55E-19	2.79E-19	1.08E-19	4.59E-20	2.09E-20	5.08E-21	1.48E-21	5.01E-22
4.96E+00 - 4.06E+00	1.40E-17	3.90E-18	8.17E-19	2.62E-19	9.85E-20	4.05E-20	1.78E-20	3.97E-21	1.06E-21	3.27E-22
4.06E+00 - 3.01E+00	1.62E-17	4.34E-18	8.96E-19	2.77E-19	1.06E-19	3.96E-20	1.67E-20	3.51E-21	8.81E-22	2.56E-22
3.01E+00 - 2.38E+00	1.61E-17	4.51E-18	9.64E-19	2.97E-19	1.06E-19	4.15E-20	1.73E-20	3.41E-21	7.77E-22	1.98E-22
2.38E+00 - 2.30E+00	1.43E-17	4.04E-18	8.87E-19	2.80E-19	1.02E-19	4.05E-20	1.70E-20	3.35E-21	7.40E-22	1.77E-22
2.30E+00 - 1.83E+00	1.70E-17	4.64E-18	8.73E-19	2.37E-19	7.62E-20	2.73E-20	1.05E-20	1.66E-21	3.89E-22	9.28E-23
1.83E+00 - 1.11E+00	1.74E-17	4.38E-18	6.98E-19	1.70E-19	5.10E-20	1.75E-20	6.63E-21	1.16E-21	2.48E-22	6.12E-23
1.11E+00 - 5.50E-01	1.51E-17	3.47E-18	4.82E-19	1.10E-19	3.22E-20	1.09E-20	4.06E-21	6.93E-22	1.44E-22	3.50E-23
5.50E-01 - 1.11E-01	9.50E-18	1.84E-18	2.06E-19	4.36E-20	1.23E-20	4.10E-21	1.51E-21	2.53E-22	5.13E-23	1.22E-23
1.11E-01 - 2.18E-02	2.57E-18	5.34E-19	6.29E-20	1.07E-20	2.09E-21	4.85E-22	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.33E-03	1.69E-18	2.73E-19	1.87E-20	2.18E-21	2.97E-22	5.14E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.33E-03 - 5.83E-04	4.98E-20	8.13E-21	5.63E-22	6.37E-23	8.35E-24	1.32E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	1.11E-20	2.09E-21	1.71E-22	1.93E-23	2.36E-24	3.17E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	6.92E-21	1.35E-21	9.30E-23	8.36E-24	8.02E-25	8.38E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	6.56E-21	1.08E-21	5.88E-23	4.32E-24	3.33E-25	2.84E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	5.45E-21	7.96E-22	3.51E-23	2.12E-24	1.42E-25	1.04E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	3.63E-21	4.62E-22	1.64E-23	6.47E-25	3.29E-26	1.83E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	1.95E-21	2.18E-22	5.97E-24	2.04E-25	8.39E-27	4.37E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	5.49E-22	5.68E-23	1.56E-24	5.30E-26	2.16E-27	9.89E-29	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 21. Armor shielded gamma tissue dose source energy importance vs. ground range for a burst height of 13.00 meters.

		IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
		GROUND RANGE (METERS)									
NEUTRON ENERGY GROUP (MEV)		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
		1.94E-18	4.62E-19	1.00E-19	3.80E-20	1.73E-20	8.63E-21	4.52E-21	1.36E-21	4.43E-22	1.51E-22
1.50E+01	- 1.22E+01	2.03E-18	4.82E-19	1.04E-19	3.95E-20	1.79E-20	8.92E-21	4.69E-21	1.41E-21	4.58E-22	1.56E-22
1.00E+01	- 8.18E+00	2.04E-18	4.91E-19	1.07E-19	4.09E-20	1.86E-20	9.27E-21	4.89E-21	1.48E-21	4.82E-22	1.65E-22
8.10E+00	- 6.37E+00	2.32E-18	5.62E-19	8.54E-20	2.09E-20	6.68E-21	2.53E-21	1.07E-21	2.64E-22	9.23E-23	3.40E-23
6.37E+00	- 4.96E+00	2.31E-18	5.34E-19	7.64E-20	1.81E-20	5.56E-21	1.95E-21	7.39E-22	1.37E-22	4.68E-23	1.68E-23
4.96E+00	- 3.01E+00	2.40E-18	5.35E-19	7.76E-20	1.94E-20	6.25E-21	2.31E-21	9.21E-22	1.68E-22	3.59E-23	1.29E-23
3.01E+00	- 2.38E+00	2.32E-18	4.98E-19	7.39E-20	2.04E-20	7.45E-21	3.18E-21	1.50E-21	4.10E-22	1.37E-22	5.13E-23
2.38E+00	- 2.30E+00	2.12E-18	5.18E-19	1.05E-19	3.58E-20	1.53E-20	7.36E-21	3.85E-21	1.24E-21	4.62E-22	1.88E-22
2.30E+00	- 1.83E+00	1.96E-18	4.86E-19	1.00E-19	3.40E-20	1.42E-20	6.64E-21	3.35E-21	9.08E-22	3.43E-22	1.29E-22
1.83E+00	- 1.11E+00	2.11E-18	5.42E-19	1.14E-19	3.81E-20	1.54E-20	6.94E-21	3.36E-21	9.22E-22	2.94E-22	1.04E-22
1.11E+00	- 5.50E-01	1.97E-18	5.66E-19	1.29E-19	4.32E-20	1.70E-20	7.32E-21	3.37E-21	8.16E-22	2.27E-22	7.03E-23
5.50E-01	- 2.47E-01	1.74E-18	5.31E-19	1.30E-19	4.44E-20	1.74E-20	7.39E-21	3.31E-21	7.44E-22	1.88E-22	5.17E-23
2.47E-01	- 1.11E-01	2.47E-18	7.04E-19	1.42E-19	4.20E-20	1.47E-20	5.72E-21	2.40E-21	4.94E-22	1.20E-22	3.31E-23
1.11E-01	- 2.18E-02	3.06E-18	7.79E-19	1.31E-19	3.47E-20	1.13E-20	4.18E-21	1.69E-21	3.37E-22	8.20E-23	2.29E-23
2.18E-02	- 3.35E-03	3.35E-18	7.74E-19	1.12E-19	2.72E-20	8.41E-21	3.00E-21	1.19E-21	2.32E-22	5.69E-23	1.65E-23
3.35E-03	- 5.83E-04	3.30E-18	6.27E-19	7.13E-20	1.58E-20	4.69E-21	1.67E-21	6.83E-22	1.50E-22	4.23E-23	1.41E-23
5.83E-04	- 1.01E-04	1.54E-18	5.64E-19	1.27E-19	3.42E-20	9.71E-21	3.10E-21	1.65E-22	5.12E-23	1.84E-23	7.16E-24
1.01E-04	- 2.90E-05	1.89E-18	6.31E-19	1.17E-19	2.58E-20	6.88E-21	1.64E-21	1.61E-22	5.05E-23	1.81E-23	7.07E-24
2.90E-05	- 1.07E-06	2.31E-18	6.86E-19	1.03E-19	1.90E-20	3.00E-21	9.20E-22	1.60E-22	5.04E-23	1.81E-23	7.11E-24
1.07E-06	- 3.06E-06	2.41E-18	6.80E-19	8.72E-20	1.34E-20	2.39E-21	5.73E-22	1.60E-22	5.03E-23	1.81E-23	7.22E-24
3.06E-06	- 1.12E-06	2.77E-18	6.84E-19	7.11E-20	9.05E-21	1.49E-21	4.10E-22	1.61E-22	5.06E-23	1.83E-23	7.22E-24
1.12E-06	- 4.14E-07	3.14E-18	6.70E-19	5.62E-20	6.38E-21	1.09E-21	3.53E-22	1.61E-22	5.08E-23	1.85E-23	7.33E-24
4.14E-07	- 1.00E-07	3.34E-18	6.53E-19	4.54E-20	4.61E-21	8.88E-22	3.35E-22	1.64E-22	5.22E-23	1.91E-23	7.60E-24
GAMMA ENERGY GROUP (MEV)		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01	- 8.00E+00	2.06E-18	4.85E-19	9.66E-20	3.39E-20	1.52E-20	7.72E-21	4.28E-21	1.53E-21	6.21E-22	2.73E-22
8.00E+00	- 6.00E+00	1.73E-18	4.03E-19	7.77E-20	2.64E-20	1.14E-20	5.64E-21	3.02E-21	1.01E-21	3.85E-22	1.58E-22
6.00E+00	- 5.00E+00	1.63E-18	3.73E-19	6.99E-20	2.31E-20	9.69E-21	4.64E-21	2.41E-21	7.62E-22	2.73E-22	1.06E-22
5.00E+00	- 4.00E+00	1.33E-18	3.00E-19	5.48E-20	1.76E-20	7.15E-21	3.33E-21	1.68E-21	5.00E-22	1.69E-22	6.17E-23
4.00E+00	- 3.00E+00	1.02E-18	2.25E-19	3.94E-20	1.21E-20	4.74E-21	2.11E-21	1.03E-21	2.80E-22	8.70E-23	2.92E-23
3.00E+00	- 2.50E+00	7.79E-19	1.68E-19	2.82E-20	8.28E-21	3.09E-21	1.32E-21	6.08E-22	1.51E-22	4.26E-23	1.30E-23
2.50E+00	- 2.00E+00	5.81E-19	1.23E-19	1.98E-20	5.57E-21	1.99E-21	8.13E-22	3.61E-22	8.24E-23	2.13E-23	5.95E-24
2.00E+00	- 1.50E+00	3.94E-19	8.14E-20	1.24E-20	3.28E-21	1.11E-21	4.27E-22	1.79E-22	3.64E-23	8.39E-24	2.08E-24
1.50E+00	- 1.00E+00	2.39E-19	4.73E-20	6.57E-21	1.60E-21	4.95E-22	1.75E-22	6.75E-23	1.17E-23	2.28E-24	4.80E-25
1.00E+00	- 7.00E-01	1.04E-19	1.96E-20	2.46E-21	5.42E-22	1.51E-22	4.83E-23	1.67E-23	3.32E-24	3.61E-25	6.05E-26
7.00E-01	- 4.50E-01	4.60E-20	8.23E-21	9.26E-22	1.83E-22	4.61E-23	1.33E-23	4.16E-24	4.71E-25	5.99E-26	8.17E-27
4.50E-01	- 3.00E-01	1.58E-20	2.62E-21	2.55E-22	4.40E-23	9.70E-24	2.44E-24	6.67E-25	5.75E-26	5.54E-27	5.70E-28
3.00E-01	- 1.50E-01	1.82E-21	3.09E-22	3.09E-23	5.41E-24	1.19E-24	2.90E-25	7.60E-26	5.90E-27	5.05E-28	4.60E-29
1.50E-01	- 1.00E-01	2.70E-23	4.00E-24	3.03E-25	3.88E-26	6.22E-27	1.11E-27	2.14E-28	8.91E-30	4.12E-31	2.03E-32
1.00E-01	- 7.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
7.00E-02	- 4.50E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.50E-02	- 3.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.00E-02	- 2.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.00E-02	- 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 22. Free-field neutron tissue dose source energy importance
vs. ground range for a burst height of 60.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	1.18E-17	4.97E-18	1.25E-18	4.35E-19	1.72E-19	7.30E-20	3.29E-20	7.78E-21	2.19E-21	6.95E-22
1.22E+01 - 1.00E+01	1.14E-17	4.81E-18	1.23E-18	4.31E-19	1.73E-19	7.39E-20	3.35E-20	7.90E-21	2.20E-21	6.84E-22
1.00E+01 - 8.18E+00	1.12E-17	4.76E-18	1.23E-18	4.43E-19	1.81E-19	7.89E-20	3.62E-20	8.74E-21	2.49E-21	7.92E-22
8.18E+00 - 6.37E+00	1.14E-17	4.79E-18	1.22E-18	4.39E-19	1.80E-19	7.95E-20	3.72E-20	9.58E-21	2.96E-21	1.03E-21
6.37E+00 - 4.96E+00	1.16E-17	4.86E-18	1.23E-18	4.47E-19	1.86E-19	8.41E-20	4.07E-20	1.14E-20	3.85E-21	1.46E-21
4.96E+00 - 4.06E+00	1.09E-17	4.60E-18	1.16E-18	4.10E-19	1.66E-19	7.30E-20	3.43E-20	8.98E-21	2.78E-21	9.64E-22
4.06E+00 - 3.01E+00	1.17E-17	4.98E-18	1.25E-18	4.34E-19	1.72E-19	7.37E-20	3.38E-20	8.34E-21	2.40E-21	7.70E-22
3.01E+00 - 2.38E+00	1.12E-17	5.01E-18	1.33E-18	4.67E-19	1.84E-19	7.77E-20	3.45E-20	7.62E-21	1.96E-21	5.45E-22
2.38E+00 - 2.30E+00	9.83E-18	4.47E-18	1.22E-18	4.39E-19	1.76E-19	7.46E-20	3.29E-20	7.05E-21	1.67E-21	4.23E-22
2.30E+00 - 1.83E+00	1.17E-17	5.06E-18	1.22E-18	3.98E-19	1.46E-19	5.78E-20	2.42E-20	4.85E-21	1.10E-21	2.67E-22
1.83E+00 - 1.11E+00	1.13E-17	4.65E-18	1.04E-18	3.18E-19	1.11E-19	4.21E-20	1.72E-20	3.30E-21	7.14E-22	1.63E-22
1.11E+00 - 5.50E-01	9.10E-18	3.62E-18	7.67E-19	2.28E-19	7.61E-20	2.76E-20	1.07E-20	1.65E-21	3.47E-22	6.24E-23
5.50E-01 - 1.11E-01	5.85E-18	2.16E-18	4.18E-19	1.16E-19	3.53E-20	1.18E-20	4.22E-21	5.80E-22	6.40E-23	0.00E-01
1.11E-01 - 2.18E-02	2.41E-18	8.47E-19	1.49E-19	3.64E-20	9.36E-21	2.51E-21	6.24E-22	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	1.12E-18	3.24E-19	3.40E-20	4.44E-21	6.81E-22	1.27E-22	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	6.97E-20	2.21E-20	2.80E-21	4.48E-22	7.72E-23	1.51E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	2.72E-20	1.03E-20	1.53E-21	2.44E-22	3.76E-23	6.98E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	2.22E-20	8.41E-21	1.19E-21	1.53E-22	1.85E-23	2.32E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	2.35E-20	8.43E-21	9.41E-22	1.01E-22	1.00E-23	1.01E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	2.46E-20	8.08E-21	7.23E-22	6.33E-23	5.39E-24	4.77E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	2.46E-20	7.13E-21	4.66E-22	3.01E-23	1.93E-24	1.33E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	2.32E-20	5.57E-21	2.83E-22	1.38E-23	7.12E-25	4.03E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	1.80E-20	3.54E-21	1.22E-22	5.01E-24	2.16E-25	1.01E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 23. Free-field gamma tissue dose source energy importance vs. ground range for a burst height of 60.00 meters.

		IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
NEUTRON ENERGY GROUP (MEV)		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01	1.22E+01	1.08E-18	4.65E-19	1.32E-19	5.52E-20	2.61E-20	1.33E-20	7.20E-21	2.34E-21	8.39E-22	3.18E-22
1.22E+01	1.00E+01	1.07E-18	4.67E-19	1.34E-19	5.62E-20	2.67E-20	1.36E-20	7.35E-21	2.38E-21	8.52E-22	3.22E-22
1.00E+01	8.18E+00	9.44E-19	4.11E-19	1.29E-19	5.10E-20	2.45E-20	1.25E-20	6.75E-21	2.19E-21	7.89E-22	2.94E-22
8.18E+00	6.37E+00	6.76E-19	2.92E-19	8.41E-20	3.52E-20	1.66E-20	8.34E-21	4.41E-21	1.37E-21	4.71E-22	1.70E-22
6.37E+00	4.96E+00	4.06E-19	1.67E-19	4.54E-20	1.87E-20	8.71E-21	4.35E-21	2.29E-21	6.99E-22	2.33E-22	8.17E-23
4.96E+00	3.91E+00	2.81E-19	1.12E-19	2.94E-20	1.21E-20	5.69E-21	2.89E-21	1.54E-21	4.82E-22	1.62E-22	5.73E-23
3.91E+00	2.38E+00	2.31E-19	9.34E-20	2.63E-20	1.13E-20	5.55E-21	2.91E-21	1.59E-21	5.10E-22	1.73E-22	6.09E-23
2.38E+00	1.94E-19	2.06E-19	8.74E-20	2.77E-20	1.29E-20	6.61E-21	3.56E-21	1.97E-21	6.33E-22	2.14E-22	7.53E-23
1.94E-19	1.63E+00	1.94E-19	8.53E-20	2.65E-20	1.36E-20	7.03E-21	3.84E-21	2.12E-21	6.78E-22	2.27E-22	7.91E-23
1.63E+00	1.52E-19	1.68E-19	8.03E-20	2.95E-20	1.42E-20	7.34E-21	3.91E-21	2.12E-21	6.51E-22	2.11E-22	7.25E-23
1.52E-19	1.11E+00	1.52E-19	7.99E-20	3.17E-20	1.51E-20	7.62E-21	3.94E-21	2.07E-21	6.06E-22	1.90E-22	6.49E-23
1.11E+00	5.59E-01	1.61E-19	9.03E-20	3.63E-20	1.67E-20	8.00E-21	3.93E-21	1.98E-21	5.42E-22	1.67E-22	5.74E-23
5.59E-01	2.75E-19	1.48E-19	1.47E-19	4.33E-20	1.77E-20	7.54E-21	3.35E-21	1.56E-21	4.00E-22	1.24E-22	4.51E-23
2.75E-19	2.18E-02	3.32E-19	1.68E-19	4.67E-20	1.64E-20	6.15E-21	2.51E-21	1.13E-21	3.00E-22	1.01E-22	3.85E-23
2.18E-02	3.35E-03	3.32E-19	1.68E-19	4.62E-20	1.44E-20	5.06E-21	2.03E-21	9.39E-22	2.68E-22	9.36E-23	3.66E-23
3.35E-03	5.83E-04	3.71E-19	1.79E-19	4.35E-20	1.24E-20	4.29E-21	1.73E-21	8.33E-22	2.51E-22	8.88E-23	3.49E-23
5.83E-04	1.01E-04	4.15E-19	1.89E-19	4.10E-20	1.09E-20	3.74E-21	1.61E-21	8.01E-22	2.47E-22	8.75E-23	3.34E-23
1.01E-04	2.90E-05	4.57E-19	1.97E-19	3.76E-20	9.68E-21	3.44E-21	1.55E-21	7.92E-22	2.46E-22	8.67E-23	3.30E-23
2.90E-05	1.07E-05	4.85E-19	1.99E-19	3.42E-20	8.80E-21	3.39E-21	1.53E-21	7.91E-22	2.46E-22	8.61E-23	3.28E-23
1.07E-05	3.06E-06	4.95E-19	1.69E-19	3.01E-20	8.04E-21	3.15E-21	1.49E-21	7.70E-22	2.38E-22	8.35E-23	3.19E-23
3.06E-06	1.12E-06	5.00E-19	1.74E-19	2.61E-20	7.52E-21	3.19E-21	1.48E-21	7.67E-22	2.36E-22	8.26E-23	3.17E-23
1.12E-06	4.14E-07	4.76E-19	1.52E-19	2.32E-20	7.23E-21	3.05E-21	1.46E-21	7.53E-22	2.30E-22	8.08E-23	3.12E-23
4.14E-07	1.00E-07	4.14E-19	1.24E-19	2.09E-20	7.00E-21	3.04E-21	1.45E-21	7.41E-22	2.26E-22	7.99E-23	3.11E-23
GAMMA ENERGY GROUP (MEV)		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01	3.00E+00	2.97E-18	1.24E-18	3.32E-19	1.32E-19	6.32E-20	3.31E-20	1.83E-20	6.26E-21	2.43E-21	1.04E-21
3.00E+00	6.00E+00	2.38E-18	9.89E-19	2.62E-19	1.03E-19	4.81E-20	2.44E-20	1.31E-20	4.19E-21	1.52E-21	6.04E-22
6.00E+00	5.00E+00	2.22E-18	9.15E-19	2.37E-19	9.05E-20	4.13E-20	2.04E-20	1.06E-20	3.22E-21	1.10E-21	4.13E-22
5.00E+00	4.00E+00	1.91E-18	7.84E-19	1.99E-19	7.46E-20	3.35E-20	1.60E-20	8.11E-21	2.31E-21	7.45E-22	2.64E-22
4.00E+00	3.00E+00	1.53E-18	6.26E-19	1.56E-19	5.68E-20	2.43E-20	1.14E-20	5.53E-21	1.45E-21	4.31E-22	1.41E-22
3.00E+00	2.50E+00	1.25E-18	5.08E-19	1.23E-19	4.36E-20	1.81E-20	8.10E-21	3.77E-21	9.07E-22	2.46E-22	7.29E-23
2.50E+00	2.00E+00	1.07E-18	4.32E-19	1.02E-19	3.52E-20	1.41E-20	6.07E-21	2.72E-21	6.01E-22	1.50E-22	4.10E-23
2.00E+00	1.50E+00	8.75E-19	3.53E-19	8.08E-20	2.68E-20	1.02E-20	4.16E-21	1.76E-21	3.51E-22	7.86E-23	1.92E-23
1.50E+00	1.00E+00	7.12E-19	2.82E-19	6.13E-20	1.91E-20	6.75E-21	2.53E-21	9.92E-22	1.70E-22	3.27E-23	6.86E-24
1.00E+00	7.00E-01	5.37E-19	2.11E-19	4.51E-20	1.24E-20	3.99E-21	1.36E-21	4.85E-22	6.84E-23	1.08E-23	1.82E-24
7.00E-01	4.50E-01	4.08E-19	1.58E-19	3.65E-20	8.05E-21	2.36E-21	7.36E-22	2.40E-22	2.83E-23	3.69E-24	5.12E-25
4.50E-01	3.00E-01	3.04E-19	1.14E-19	2.08E-20	5.00E-21	1.33E-21	3.74E-22	1.10E-22	1.06E-23	1.10E-24	1.20E-25
3.00E-01	1.50E-01	1.97E-19	7.43E-20	1.28E-20	2.81E-21	6.82E-22	1.76E-22	4.80E-23	3.90E-24	3.44E-25	3.20E-26
1.50E-01	1.00E-01	1.24E-19	4.50E-20	6.71E-21	1.20E-21	2.33E-22	4.68E-23	1.06E-23	5.32E-25	2.84E-26	1.57E-27
1.00E-01	7.00E-02	9.23E-20	3.23E-20	4.21E-21	6.46E-22	1.09E-22	1.97E-23	3.73E-24	6.10E-27	6.10E-27	2.67E-28
7.00E-02	4.50E-02	8.36E-20	2.59E-20	2.62E-21	3.17E-22	4.36E-23	6.60E-24	1.07E-24	3.21E-26	1.08E-27	3.95E-29
4.50E-02	3.00E-02	6.20E-20	1.41E-20	6.96E-22	3.97E-23	2.54E-24	1.78E-25	1.34E-26	8.92E-30	6.55E-31	5.15E-33
3.00E-02	2.00E-02	1.09E-20	1.03E-21	6.69E-24	4.96E-26	3.99E-28	3.41E-30	3.07E-32	2.83E-36	2.02E-39	2.10E-39
2.00E-02	1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 24. Armor shielded neutron tissue dose source energy importance
vs. ground range for a burst height of 60.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	8.56E-18	3.71E-18	9.74E-19	3.41E-19	1.33E-19	5.47E-20	2.37E-20	5.03E-21	1.25E-21	3.56E-22
1.22E+01 - 1.00E+01	8.24E-18	3.58E-18	9.48E-19	3.35E-19	1.32E-19	5.52E-20	2.41E-20	5.16E-21	1.28E-21	3.58E-22
1.00E+01 - 8.18E+00	8.24E-18	3.58E-18	9.57E-19	3.45E-19	1.39E-19	5.92E-20	2.62E-20	5.75E-21	1.46E-21	4.18E-22
8.18E+00 - 6.37E+00	8.29E-18	3.59E-18	9.56E-19	3.44E-19	1.38E-19	5.89E-20	2.62E-20	5.94E-21	1.46E-21	4.94E-22
6.37E+00 - 4.96E+00	8.48E-18	3.71E-18	9.90E-19	3.56E-19	1.43E-19	6.10E-20	2.74E-20	6.50E-21	1.88E-21	6.32E-22
4.96E+00 - 4.06E+00	8.20E-18	3.63E-18	9.65E-19	3.37E-19	1.31E-19	5.38E-20	2.34E-20	5.14E-21	1.36E-21	4.17E-22
4.06E+00 - 3.01E+00	9.37E-18	4.19E-18	1.09E-18	3.66E-19	1.36E-19	5.38E-20	2.27E-20	4.69E-21	1.16E-21	3.32E-22
3.01E+00 - 2.38E+00	9.57E-18	4.41E-18	1.16E-18	3.88E-19	1.43E-19	5.57E-20	2.28E-20	4.37E-21	9.72E-22	2.44E-22
2.38E+00 - 2.30E+00	8.51E-18	3.90E-18	1.05E-18	3.57E-19	1.35E-19	5.33E-20	2.20E-20	4.12E-21	8.74E-22	2.04E-22
2.30E+00 - 1.83E+00	1.05E-17	4.58E-18	1.06E-18	3.11E-19	1.03E-19	3.68E-20	1.40E-20	2.40E-21	4.93E-22	1.15E-22
1.83E+00 - 1.11E+00	1.05E-17	4.31E-18	8.61E-19	2.29E-19	7.07E-20	2.42E-20	9.01E-21	1.52E-21	3.13E-22	7.32E-23
1.11E+00 - 5.50E-01	8.56E-18	3.31E-18	5.97E-19	1.52E-19	4.56E-20	1.52E-20	5.51E-21	8.86E-22	1.72E-22	3.78E-23
5.50E-01 - 1.11E-01	4.91E-18	1.69E-18	2.60E-19	6.21E-20	1.75E-20	5.58E-21	1.95E-21	2.88E-22	4.90E-23	8.56E-24
1.11E-01 - 2.18E-02	1.50E-18	5.27E-19	7.90E-20	1.44E-20	2.90E-21	6.90E-22	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	8.89E-19	2.53E-19	2.54E-20	3.17E-21	4.56E-22	7.86E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.63E-04	2.65E-20	7.47E-21	7.42E-22	9.20E-23	1.29E-23	2.06E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.63E-04 - 1.01E-04	6.34E-21	2.04E-21	2.26E-22	2.83E-23	3.70E-24	5.19E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	4.14E-21	1.29E-21	1.23E-22	1.25E-23	1.29E-24	1.42E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	3.62E-21	9.98E-22	7.85E-23	6.36E-24	5.27E-25	4.68E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	2.79E-21	7.24E-22	4.68E-23	3.16E-24	2.30E-25	1.73E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	1.74E-21	3.93E-22	1.86E-23	9.57E-25	5.09E-26	3.98E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	8.48E-22	1.71E-22	6.51E-24	2.79E-25	1.28E-26	6.55E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	2.18E-22	4.27E-23	1.48E-24	6.08E-26	2.64E-27	1.28E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 25. Armor shielded gamma tissue dose source energy importance
vs. ground range for a burst height of 60.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	1.05E-18	4.31E-19	1.23E-19	4.70E-20	2.07E-20	1.02E-20	5.31E-21	1.60E-21	5.23E-22	1.79E-22
1.22E+01 - 1.00E+01	1.06E-18	4.39E-19	1.30E-19	4.87E-20	2.14E-20	1.05E-20	5.49E-21	1.66E-21	5.41E-22	1.85E-22
1.00E+01 - 8.18E+00	1.07E-18	4.44E-19	1.32E-19	5.00E-20	2.21E-20	1.08E-20	5.67E-21	1.72E-21	5.62E-22	1.93E-22
8.18E+00 - 6.37E+00	1.31E-18	5.18E-19	1.60E-19	2.73E-20	9.17E-21	3.46E-21	1.42E-21	3.12E-22	1.09E-22	4.00E-23
6.37E+00 - 4.96E+00	1.27E-18	4.85E-19	8.85E-20	2.36E-20	7.72E-21	2.73E-21	1.01E-21	1.52E-22	5.17E-23	1.85E-23
4.96E+00 - 4.06E+00	1.30E-18	4.86E-19	8.93E-20	2.52E-20	8.72E-21	3.25E-21	1.26E-21	2.14E-22	4.15E-23	1.37E-23
4.06E+00 - 3.01E+00	1.27E-18	4.61E-19	8.99E-20	2.69E-20	1.03E-20	4.36E-21	2.00E-21	5.21E-22	1.71E-22	6.41E-23
3.01E+00 - 2.38E+00	1.23E-18	5.01E-19	1.26E-19	4.73E-20	2.07E-20	9.84E-21	5.05E-21	1.59E-21	5.87E-22	2.38E-22
2.38E+00 - 2.30E+00	1.18E-18	4.82E-19	1.21E-19	4.49E-20	1.91E-20	8.85E-21	4.40E-21	1.29E-21	4.37E-22	1.63E-22
2.30E+00 - 1.83E+00	1.34E-18	5.60E-19	1.42E-19	5.10E-20	2.09E-20	9.33E-21	4.47E-21	1.21E-21	3.79E-22	1.32E-22
1.83E+00 - 1.11E+00	1.41E-18	6.17E-19	1.62E-19	5.78E-20	2.31E-20	9.86E-21	4.45E-21	1.04E-21	2.85E-22	8.70E-23
1.11E+00 - 5.50E-01	1.32E-18	5.90E-19	1.61E-19	5.79E-20	2.32E-20	9.78E-21	4.29E-21	9.22E-22	2.25E-22	6.08E-23
5.50E-01 - 1.11E-01	1.79E-18	7.57E-19	1.77E-19	5.59E-20	2.01E-20	7.76E-21	3.20E-21	6.39E-22	1.51E-22	4.06E-23
1.11E-01 - 2.10E-02	2.07E-18	8.11E-19	1.65E-19	4.73E-20	1.57E-20	5.74E-21	2.58E-21	4.36E-22	1.01E-22	2.68E-23
2.10E-02 - 3.35E-03	2.17E-18	7.87E-19	1.42E-19	3.79E-20	1.18E-20	4.10E-21	1.56E-21	2.80E-22	6.27E-23	1.64E-23
3.35E-03 - 5.83E-04	1.84E-18	5.84E-19	8.86E-20	2.16E-20	6.20E-21	2.04E-21	7.60E-22	1.40E-22	3.36E-23	8.91E-24
5.83E-04 - 1.01E-04	1.01E-18	5.11E-19	1.46E-19	4.29E-20	1.28E-20	4.22E-21	1.99E-22	2.41E-23	2.24E-23	8.70E-24
1.01E-04 - 2.90E-05	1.22E-18	5.92E-19	1.39E-19	3.41E-20	8.47E-21	2.35E-21	1.94E-22	6.14E-23	2.20E-23	8.54E-24
2.90E-05 - 1.07E-05	1.44E-18	6.33E-19	1.27E-19	2.60E-20	5.44E-21	1.32E-21	1.93E-22	6.11E-23	2.18E-23	8.46E-24
1.07E-05 - 3.06E-06	1.50E-18	6.39E-19	1.10E-19	1.88E-20	3.42E-21	7.92E-22	1.93E-22	6.07E-23	2.16E-23	8.38E-24
3.06E-06 - 1.12E-06	1.70E-18	6.47E-19	9.17E-20	1.28E-20	2.07E-21	5.31E-22	1.93E-22	6.03E-23	2.14E-23	8.35E-24
1.12E-06 - 4.14E-07	1.84E-18	6.60E-19	7.23E-20	8.80E-21	1.47E-21	4.41E-22	1.91E-22	5.95E-23	2.12E-23	8.28E-24
4.14E-07 - 1.00E-07	1.87E-18	6.10E-19	5.65E-20	6.26E-21	1.14E-21	4.03E-22	1.91E-22	5.95E-23	2.12E-23	8.32E-24
GAMMA ENERGY GROUP (MEV)	GROUND RANGE (METERS)									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01 - 8.00E+00	8.29E-19	3.43E-19	9.16E-20	3.62E-20	1.72E-20	9.02E-21	4.99E-21	1.73E-21	6.76E-22	2.90E-22
8.00E+00 - 6.00E+00	6.91E-19	2.84E-19	7.43E-20	2.87E-20	1.33E-20	6.75E-21	3.61E-21	1.16E-21	4.24E-22	1.70E-22
6.00E+00 - 5.00E+00	6.47E-19	2.64E-19	6.69E-20	2.51E-20	1.13E-20	5.55E-21	2.89E-21	8.76E-22	3.01E-22	1.13E-22
5.00E+00 - 4.00E+00	5.24E-19	2.12E-19	5.27E-20	1.93E-20	8.47E-21	4.05E-21	2.04E-21	5.83E-22	1.88E-22	6.65E-23
4.00E+00 - 3.00E+00	3.93E-19	1.59E-19	3.83E-20	1.36E-20	5.73E-21	2.63E-21	1.27E-21	3.32E-22	9.80E-23	3.18E-23
3.00E+00 - 2.50E+00	3.03E-19	1.19E-19	2.76E-20	9.35E-21	3.77E-21	1.65E-21	7.61E-22	1.60E-22	4.82E-23	1.42E-23
2.50E+00 - 2.00E+00	2.25E-19	8.77E-20	1.96E-20	6.39E-21	2.48E-21	1.04E-21	4.58E-22	9.93E-23	2.43E-23	6.54E-24
2.00E+00 - 1.50E+00	1.52E-19	5.82E-20	1.24E-20	3.86E-21	1.42E-21	5.60E-22	2.32E-22	4.45E-23	9.69E-24	2.32E-24
1.50E+00 - 1.00E+00	9.11E-20	3.39E-20	6.69E-21	1.93E-21	6.50E-22	2.35E-22	8.69E-23	1.44E-23	2.67E-24	5.45E-25
1.00E+00 - 7.00E-01	3.96E-20	1.43E-20	2.59E-21	6.75E-22	2.04E-22	6.57E-23	2.22E-23	2.88E-24	4.28E-25	6.95E-26
7.00E-01 - 4.50E-01	1.74E-20	6.10E-21	1.00E-21	2.38E-22	6.40E-23	1.84E-23	5.58E-24	5.91E-25	7.21E-26	9.65E-27
4.50E-01 - 3.00E-01	5.88E-21	1.95E-21	2.82E-22	5.74E-23	1.33E-24	3.34E-24	8.87E-25	7.25E-26	6.81E-27	6.93E-28
3.00E-01 - 1.50E-01	7.47E-22	2.56E-22	3.70E-23	7.24E-24	1.60E-24	3.86E-25	9.96E-26	7.62E-27	6.53E-28	5.97E-29
1.50E-01 - 1.00E-01	1.04E-23	3.19E-24	3.57E-25	5.25E-26	8.56E-27	1.52E-27	2.87E-28	1.18E-29	5.48E-31	2.71E-32
1.00E-01 - 7.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
7.00E-02 - 4.50E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.50E-02 - 3.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.00E-02 - 2.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.00E-02 - 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 26. Free-field neutron tissue dose source energy importance vs. ground range for a burst height of 129.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	3.99E-18	2.80E-18	1.63E-18	4.12E-19	1.72E-19	7.80E-20	3.74E-20	9.57E-21	2.76E-21	8.79E-22
1.22E+01 - 1.00E+01	3.91E-18	2.74E-18	1.63E-18	4.09E-19	1.72E-19	7.87E-20	3.80E-20	9.74E-21	2.78E-21	8.67E-22
1.00E+01 - 8.18E+00	3.90E-18	2.74E-18	1.04E-18	4.20E-19	1.79E-19	8.31E-20	4.09E-20	1.08E-20	3.16E-21	1.01E-21
8.18E+00 - 6.37E+00	3.94E-18	2.76E-18	1.04E-18	4.17E-19	1.80E-19	8.39E-20	4.21E-20	1.19E-20	3.76E-21	1.30E-21
6.37E+00 - 4.96E+00	3.91E-18	2.73E-18	1.04E-18	4.23E-19	1.89E-19	9.38E-20	4.88E-20	1.44E-20	4.82E-21	1.79E-21
4.96E+00 - 4.06E+00	3.71E-18	2.61E-18	9.85E-19	3.94E-19	1.73E-19	8.34E-20	4.19E-20	1.14E-20	3.51E-21	1.19E-21
4.06E+00 - 3.01E+00	4.09E-18	2.87E-18	1.03E-18	4.24E-19	1.84E-19	8.61E-20	4.19E-20	1.07E-20	3.04E-21	9.55E-22
3.01E+00 - 2.38E+00	4.19E-18	2.99E-18	1.16E-18	4.56E-19	1.93E-19	8.75E-20	4.14E-20	9.84E-21	2.52E-21	6.93E-22
2.38E+00 - 2.30E+00	3.76E-18	2.71E-18	1.07E-18	4.23E-19	1.81E-19	8.17E-20	3.85E-20	8.98E-21	2.18E-21	5.45E-22
2.30E+00 - 1.83E+00	4.20E-18	2.93E-18	1.05E-18	4.83E-19	1.54E-19	6.66E-20	2.99E-20	6.35E-21	1.44E-21	3.45E-22
1.83E+00 - 1.11E+00	3.72E-18	2.54E-18	8.57E-19	2.96E-19	1.19E-19	5.20E-20	2.27E-20	4.43E-21	9.32E-22	2.07E-22
1.11E+00 - 5.50E-01	2.81E-18	1.89E-18	6.17E-19	2.06E-19	8.29E-20	3.55E-20	1.43E-20	2.53E-21	4.57E-22	8.03E-23
5.50E-01 - 1.11E-01	1.58E-18	1.03E-18	3.16E-19	9.85E-20	4.10E-20	1.71E-20	6.46E-21	8.36E-22	8.94E-23	0.00E-01
1.11E-01 - 2.18E-02	5.90E-19	3.77E-19	1.06E-19	2.91E-20	1.16E-20	4.23E-21	1.21E-21	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	2.61E-19	1.42E-19	2.72E-20	4.41E-21	7.64E-22	1.51E-22	0.60E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	1.77E-20	1.01E-20	2.32E-21	4.49E-22	8.81E-23	1.83E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	8.38E-21	5.31E-21	1.23E-21	2.40E-22	4.17E-23	7.35E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	7.03E-21	4.17E-21	9.22E-22	1.46E-22	2.02E-23	2.78E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	6.50E-21	3.76E-21	7.60E-22	9.40E-23	1.06E-23	1.22E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	6.07E-21	3.33E-21	5.31E-22	5.69E-23	5.67E-24	5.49E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	5.04E-21	2.49E-21	3.06E-22	2.61E-23	1.93E-24	1.42E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	3.68E-21	1.75E-21	1.60E-22	1.11E-23	6.72E-25	3.95E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	2.23E-21	9.96E-22	6.99E-23	3.58E-24	1.73E-25	9.44E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 27. Free-field gamma tissue dose source energy importance vs. ground range for a burst height of 129.00 meters.

NEUTRON ENERGY GROUP (HEV)	IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
	GROUND RANGE (METERS)									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	4.07E-19	3.02E-19	1.21E-19	5.41E-20	2.75E-20	1.48E-20	8.22E-21	2.75E-21	1.00E-21	3.83E-22
1.22E+01 - 1.00E+01	4.10E-19	3.05E-19	1.22E-19	5.52E-20	2.80E-20	1.51E-20	8.41E-21	2.81E-21	1.02E-21	3.88E-22
1.00E+01 - 8.18E+00	3.64E-19	2.72E-19	1.10E-19	5.01E-20	2.55E-20	1.38E-20	7.74E-21	2.59E-21	9.31E-22	3.51E-22
8.18E+00 - 6.37E+00	2.59E-19	1.92E-19	7.66E-20	3.43E-20	1.72E-20	9.13E-21	5.01E-21	1.61E-21	5.54E-22	2.01E-22
6.37E+00 - 4.96E+00	1.50E-19	1.10E-19	4.17E-20	1.79E-20	8.82E-21	4.64E-21	2.51E-21	7.85E-22	2.62E-22	9.19E-23
4.96E+00 - 3.61E+00	1.00E-19	7.24E-20	2.64E-20	1.12E-20	5.59E-21	2.97E-21	1.63E-21	5.20E-22	1.77E-22	6.25E-23
3.61E+00 - 2.38E+00	8.36E-20	6.01E-20	2.33E-20	1.05E-20	5.46E-21	2.99E-21	1.67E-21	5.52E-22	1.90E-22	6.73E-23
2.38E+00 - 1.83E+00	8.18E-20	6.02E-20	2.53E-20	1.23E-20	6.64E-21	3.72E-21	2.12E-21	7.03E-22	2.40E-22	8.48E-23
1.83E+00 - 1.33E+00	8.02E-20	5.98E-20	2.62E-20	1.32E-20	7.15E-21	4.01E-21	2.29E-21	7.60E-22	2.58E-22	9.00E-23
1.33E+00 - 1.11E+00	7.43E-20	5.61E-20	2.65E-20	1.37E-20	7.44E-21	4.12E-21	2.29E-21	7.24E-22	2.37E-22	8.19E-23
1.11E+00 - 5.50E-01	7.23E-20	5.58E-20	2.80E-20	1.46E-20	7.79E-21	4.18E-21	2.26E-21	6.76E-22	2.15E-22	7.36E-23
5.50E-01 - 1.11E-01	8.06E-20	6.29E-20	3.22E-20	1.62E-20	8.24E-21	4.20E-21	2.16E-21	6.06E-22	1.88E-22	6.50E-23
1.11E-01 - 2.18E-02	1.02E-19	7.93E-20	3.81E-20	1.74E-20	7.94E-21	3.66E-21	1.74E-21	4.52E-22	1.42E-22	5.18E-23
2.18E-02 - 3.35E-03	1.28E-19	9.55E-20	4.09E-20	1.64E-20	6.87E-21	2.77E-21	1.26E-21	3.40E-22	1.16E-22	4.52E-23
3.35E-03 - 5.63E-04	1.44E-19	1.03E-19	4.01E-20	1.45E-20	5.41E-21	2.24E-21	1.05E-21	3.06E-22	1.09E-22	4.29E-23
5.63E-04 - 1.01E-04	1.54E-19	1.07E-19	3.77E-20	1.26E-20	4.56E-21	1.93E-21	9.44E-22	2.93E-22	1.07E-22	4.17E-23
1.01E-04 - 2.90E-05	1.60E-19	1.08E-19	3.40E-20	1.09E-20	3.96E-21	1.76E-21	8.99E-22	2.86E-22	1.05E-22	4.08E-23
2.90E-05 - 3.06E-06	1.60E-19	1.04E-19	3.08E-20	9.24E-21	3.52E-21	1.63E-21	8.75E-22	2.86E-22	1.03E-22	3.97E-23
3.06E-06 - 1.12E-06	1.54E-19	9.76E-20	2.69E-20	8.16E-21	3.29E-21	1.61E-21	8.68E-22	2.84E-22	1.02E-22	3.86E-23
1.12E-06 - 4.14E-07	1.43E-19	8.81E-20	2.35E-20	7.43E-21	3.16E-21	1.59E-21	8.64E-22	2.81E-22	9.95E-23	3.75E-23
4.14E-07 - 1.00E-07	1.26E-19	7.61E-20	1.97E-20	6.74E-21	3.06E-21	1.59E-21	8.68E-22	2.80E-22	9.71E-23	3.64E-23
	1.07E-19	6.30E-20	1.72E-20	6.32E-21	3.00E-21	1.59E-21	8.68E-22	2.74E-22	9.39E-23	3.50E-23
	8.62E-20	4.94E-20	1.53E-20	6.02E-21	2.98E-21	1.60E-21	8.77E-22	2.70E-22	9.17E-23	3.45E-23
GAMMA ENERGY GROUP (HEV)	GROUND RANGE (METERS)									
	GROUND RANGE (METERS)									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01 - 8.00E+00	8.84E-19	6.00E-19	2.44E-19	1.11E-19	5.53E-20	3.04E-20	1.82E-20	7.32E-21	3.07E-21	1.31E-21
8.00E+00 - 6.00E+00	7.07E-19	4.79E-19	1.93E-19	8.62E-20	4.19E-20	2.26E-20	1.32E-20	5.04E-21	1.99E-21	7.89E-22
6.00E+00 - 5.00E+00	6.48E-19	4.39E-19	1.74E-19	7.59E-20	3.60E-20	1.89E-20	1.08E-20	3.69E-21	1.45E-21	5.42E-22
5.00E+00 - 4.00E+00	5.53E-19	3.75E-19	1.46E-19	6.27E-20	2.91E-20	1.49E-20	8.32E-21	2.84E-21	9.94E-22	3.49E-22
4.00E+00 - 3.00E+00	4.40E-19	2.99E-19	1.15E-19	4.79E-20	2.16E-20	1.08E-20	5.79E-21	1.83E-21	5.85E-22	1.88E-22
3.00E+00 - 2.50E+00	3.56E-19	2.42E-19	9.14E-20	3.70E-20	1.61E-20	7.71E-21	3.99E-21	1.15E-21	3.37E-22	9.86E-23
2.50E+00 - 2.00E+00	3.02E-19	2.06E-19	7.62E-20	2.99E-20	1.26E-20	5.88E-21	2.93E-21	7.74E-22	2.06E-22	5.51E-23
2.00E+00 - 1.50E+00	2.46E-19	1.68E-19	6.07E-20	2.29E-20	9.29E-21	4.13E-21	1.96E-21	4.56E-22	1.07E-22	2.54E-23
1.50E+00 - 1.00E+00	1.97E-19	1.34E-19	4.64E-20	1.64E-20	6.28E-21	2.63E-21	1.14E-21	2.20E-22	4.32E-23	8.75E-24
1.00E+00 - 7.00E-01	1.48E-19	1.00E-19	3.30E-20	1.08E-20	4.82E-21	1.46E-21	5.66E-22	8.70E-23	1.37E-23	2.25E-24
7.00E-01 - 4.50E-01	1.13E-19	7.57E-20	2.36E-20	7.15E-21	2.37E-21	8.18E-22	2.85E-22	3.53E-23	4.57E-24	6.22E-25
4.50E-01 - 3.00E-01	8.42E-20	5.56E-20	1.62E-20	4.53E-21	1.37E-21	4.24E-22	1.32E-22	1.30E-23	1.35E-24	1.47E-25
3.00E-01 - 1.50E-01	5.63E-20	3.67E-20	1.01E-20	2.64E-21	7.31E-22	5.73E-23	4.77E-24	4.26E-25	4.26E-26	4.00E-26
1.50E-01 - 1.00E-01	3.47E-20	2.15E-20	5.15E-21	1.13E-21	2.55E-22	5.70E-23	6.65E-25	2.01E-27	3.60E-26	2.01E-27
1.00E-01 - 7.00E-02	2.49E-20	1.48E-20	3.20E-21	6.18E-22	1.20E-22	3.45E-23	4.59E-24	1.86E-25	7.97E-27	3.54E-28
7.00E-02 - 4.50E-02	1.88E-20	1.04E-20	1.86E-21	2.95E-22	4.82E-23	7.95E-24	1.35E-24	4.23E-26	1.47E-27	5.47E-29
4.50E-02 - 3.00E-02	8.37E-21	4.02E-21	4.09E-22	3.28E-23	2.64E-24	2.08E-25	1.65E-26	1.16E-28	8.84E-31	7.18E-33
3.00E-02 - 2.00E-02	4.33E-22	1.24E-22	2.63E-24	3.07E-26	2.86E-28	2.65E-30	2.45E-32	2.41E-36	1.80E-39	1.75E-39
2.00E-02 - 1.60E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 28. Armor shielded neutron tissue dose source energy importance vs. ground range for a burst height of 129.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	3.05E-18	2.17E-18	8.30E-19	3.26E-19	1.34E-19	5.86E-20	2.68E-20	6.13E-21	1.56E-21	4.42E-22
1.22E+01 - 1.00E+01	2.98E-18	2.11E-18	8.11E-19	3.22E-19	1.34E-19	5.90E-20	2.73E-20	6.30E-21	1.60E-21	4.48E-22
1.00E+01 - 8.18E+00	2.99E-18	2.13E-18	8.22E-19	3.31E-19	1.39E-19	6.20E-20	2.95E-20	7.07E-21	1.84E-21	5.26E-22
8.18E+00 - 6.37E+00	3.03E-18	2.15E-18	8.25E-19	3.31E-19	1.40E-19	6.29E-20	2.98E-20	7.33E-21	2.01E-21	6.19E-22
6.37E+00 - 4.96E+00	3.09E-18	2.20E-18	8.55E-19	3.44E-19	1.46E-19	6.67E-20	3.20E-20	8.09E-21	2.35E-21	7.79E-22
4.96E+00 - 4.06E+00	3.06E-18	2.18E-18	8.45E-19	3.31E-19	1.37E-19	6.09E-20	2.70E-20	6.41E-21	1.70E-21	5.16E-22
4.06E+00 - 3.01E+00	3.59E-18	2.55E-18	9.65E-19	3.63E-19	1.44E-19	6.10E-20	2.66E-20	5.88E-21	1.46E-21	4.12E-22
3.01E+00 - 2.38E+00	3.81E-18	2.71E-18	1.02E-18	3.79E-19	1.47E-19	6.11E-20	2.66E-20	5.51E-21	1.24E-21	3.06E-22
2.38E+00 - 2.30E+00	3.36E-18	2.41E-18	9.16E-19	3.47E-19	1.36E-19	5.79E-20	2.51E-20	5.22E-21	1.14E-21	2.61E-22
2.30E+00 - 1.83E+00	3.89E-18	2.67E-18	8.98E-19	2.97E-19	1.05E-19	4.06E-20	1.66E-20	3.06E-21	6.28E-22	1.42E-22
1.83E+00 - 1.11E+00	3.49E-18	2.31E-18	7.01E-19	2.12E-19	7.28E-20	2.78E-20	1.11E-20	1.96E-21	3.90E-22	8.67E-23
1.11E+00 - 5.50E-01	2.53E-18	1.63E-18	4.64E-19	1.35E-19	4.63E-20	1.80E-20	7.06E-21	1.15E-21	2.09E-22	4.24E-23
5.50E-01 - 1.11E-01	1.13E-18	7.26E-19	1.87E-19	5.12E-20	1.89E-20	7.43E-21	2.76E-21	3.75E-22	5.57E-23	7.86E-24
1.11E-01 - 2.13E-02	4.38E-19	2.48E-19	6.23E-20	1.42E-20	3.18E-21	8.11E-22	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.13E-02 - 3.35E-03	2.04E-19	1.16E-19	1.99E-20	3.16E-21	5.16E-22	9.37E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	5.95E-21	3.23E-21	5.75E-22	9.05E-23	1.46E-23	2.52E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	1.65E-21	9.30E-22	1.84E-22	2.77E-23	4.12E-24	6.52E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	1.05E-21	5.92E-22	9.42E-23	1.20E-23	1.30E-23	1.66E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	7.86E-22	4.11E-22	5.62E-23	5.96E-24	5.43E-25	5.43E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.05E-06	5.45E-22	2.71E-22	3.22E-23	2.76E-24	2.33E-25	2.00E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.05E-06 - 1.12E-06	2.67E-22	1.39E-22	1.14E-23	8.16E-25	5.04E-26	3.34E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	1.15E-22	4.82E-23	4.01E-24	2.09E-25	1.22E-26	6.65E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	2.69E-23	1.20E-23	8.41E-25	4.24E-26	2.20E-27	1.15E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 29. Armor shielded gamma tissue dose source energy importance vs. ground range for a burst height of 129.00 meters.

NEUTRON ENERGY GROUP (NEV)		IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01	- 1.22E+01	3.56E-19	2.43E-19	1.02E-19	4.31E-20	2.36E-20	1.21E-20	6.26E-21	1.87E-21	6.16E-22	2.13E-22
1.22E+01	- 8.18E+00	3.69E-19	2.61E-19	1.05E-19	4.49E-20	2.46E-20	1.26E-20	6.55E-21	1.95E-21	6.39E-22	2.21E-22
1.00E+01	- 8.18E+00	3.71E-19	2.62E-19	1.05E-19	4.58E-20	2.55E-20	1.33E-20	6.84E-21	2.02E-21	6.62E-22	2.28E-22
8.18E+00	- 6.37E+00	4.32E-19	2.84E-19	8.36E-20	2.55E-20	7.79E-21	3.55E-21	1.61E-21	3.81E-22	1.28E-22	4.70E-23
6.37E+00	- 4.96E+00	4.00E-19	2.59E-19	7.32E-20	2.18E-20	7.14E-21	3.68E-21	1.11E-21	2.03E-22	5.80E-23	2.07E-23
4.96E+00	- 4.06E+00	3.99E-19	2.60E-19	7.45E-20	2.32E-20	7.91E-21	3.10E-21	1.36E-21	2.85E-22	6.08E-23	1.50E-23
4.06E+00	- 3.61E+00	3.80E-19	2.51E-19	7.44E-20	2.54E-20	9.84E-21	4.47E-21	2.26E-21	6.58E-22	2.18E-22	8.06E-23
3.61E+00	- 2.38E+00	4.21E-19	2.94E-19	1.08E-19	4.48E-20	2.10E-20	1.11E-20	6.10E-21	1.99E-21	7.23E-22	2.88E-22
2.38E+00	- 2.30E+00	4.13E-19	2.89E-19	1.06E-19	4.33E-20	2.00E-20	1.02E-20	5.40E-21	1.62E-21	5.42E-22	1.98E-22
2.30E+00	- 1.83E+00	4.90E-19	3.43E-19	1.26E-19	4.98E-20	2.23E-20	1.09E-20	5.50E-21	1.51E-21	4.66E-22	1.59E-22
1.83E+00	- 1.11E+00	5.67E-19	4.03E-19	1.48E-19	5.76E-20	2.43E-20	1.11E-20	5.33E-21	1.32E-21	3.58E-22	1.07E-22
1.11E+00	- 5.50E-01	5.56E-19	3.99E-19	1.49E-19	5.83E-20	2.41E-20	1.07E-20	5.01E-21	1.16E-21	2.87E-22	7.55E-23
5.50E-01	- 1.11E-01	6.80E-19	4.66E-19	1.56E-19	5.43E-20	2.09E-20	8.83E-21	3.90E-21	8.17E-22	1.91E-22	4.94E-23
1.11E-01	- 2.18E-02	6.83E-19	4.52E-19	1.37E-19	4.40E-20	1.65E-20	6.84E-21	2.91E-21	5.60E-22	1.24E-22	3.11E-23
2.18E-02	- 3.35E-03	6.37E-19	4.07E-19	1.13E-19	3.39E-20	1.23E-20	4.96E-21	2.01E-21	3.53E-22	7.28E-23	1.75E-23
3.35E-03	- 5.83E-04	4.25E-19	2.57E-19	6.37E-20	1.73E-20	6.57E-21	2.65E-21	1.02E-21	1.64E-22	3.44E-23	1.08E-23
5.83E-04	- 1.01E-04	4.48E-19	3.33E-19	1.25E-19	4.32E-20	1.43E-20	5.00E-21	2.24E-22	7.26E-23	2.69E-23	1.06E-23
1.01E-04	- 2.90E-05	5.00E-19	3.50E-19	1.23E-19	3.51E-20	9.52E-21	2.81E-21	2.19E-22	7.24E-23	2.66E-23	1.03E-23
2.90E-05	- 1.07E-05	5.31E-19	3.53E-19	1.06E-19	2.64E-20	6.10E-21	1.54E-21	2.18E-22	7.24E-23	2.63E-23	1.02E-23
1.07E-05	- 3.06E-06	5.28E-19	3.47E-19	9.06E-20	1.87E-20	3.76E-21	9.09E-22	2.18E-22	7.21E-23	2.59E-23	9.94E-24
3.06E-06	- 1.12E-06	5.14E-19	3.17E-19	7.09E-20	1.22E-20	2.21E-21	5.95E-22	2.20E-22	7.21E-23	2.55E-23	9.71E-24
1.12E-06	- 4.14E-07	4.90E-19	2.84E-19	5.14E-20	8.10E-21	1.51E-21	4.86E-22	2.21E-22	7.11E-23	2.49E-23	9.43E-24
4.14E-07	- 1.00E-07	4.55E-19	2.52E-19	4.08E-20	5.69E-21	1.15E-21	4.46E-22	2.24E-22	7.07E-23	2.45E-23	9.32E-24
GAMMA ENERGY GROUP (NEV)		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01	- 8.00E+00	2.45E-19	1.63E-19	6.63E-20	3.01E-20	1.50E-20	8.27E-21	4.94E-21	1.98E-21	8.32E-22	3.57E-22
8.00E+00	- 6.00E+00	2.02E-19	1.34E-19	5.35E-20	2.37E-20	1.15E-20	6.19E-21	3.60E-21	1.36E-21	5.37E-22	2.15E-22
6.00E+00	- 5.00E+00	1.83E-19	1.22E-19	4.79E-20	2.07E-20	9.76E-21	5.09E-21	2.88E-21	1.03E-21	3.81E-22	1.43E-22
5.00E+00	- 4.00E+00	1.48E-19	9.75E-20	3.76E-20	1.59E-20	7.32E-21	3.73E-21	2.06E-21	6.94E-22	2.42E-22	8.56E-23
4.00E+00	- 3.00E+00	1.10E-19	7.23E-20	2.72E-20	1.11E-20	4.95E-21	2.44E-21	1.30E-21	4.03E-22	1.29E-22	4.16E-23
3.00E+00	- 2.50E+00	8.18E-20	5.35E-20	1.95E-20	7.64E-21	3.25E-21	1.53E-21	7.80E-22	2.21E-22	6.39E-23	1.86E-23
2.50E+00	- 2.00E+00	5.94E-20	3.89E-20	1.37E-20	5.21E-21	2.14E-21	9.75E-22	4.77E-22	1.24E-22	3.26E-23	8.66E-24
2.00E+00	- 1.50E+00	3.89E-20	2.55E-20	8.67E-21	3.14E-21	1.23E-21	5.34E-22	2.48E-22	5.66E-23	1.31E-23	3.08E-24
1.50E+00	- 1.00E+00	2.23E-20	1.45E-20	4.64E-21	1.55E-21	5.70E-22	2.32E-22	9.88E-23	1.87E-23	3.59E-24	7.12E-25
1.00E+00	- 7.00E-01	9.21E-21	5.96E-21	1.79E-21	5.43E-22	1.82E-22	6.68E-23	2.54E-23	3.76E-24	5.69E-25	8.92E-26
7.00E-01	- 4.50E-01	3.85E-21	2.48E-21	6.91E-22	1.90E-22	5.87E-23	1.97E-23	6.67E-24	7.73E-25	9.36E-26	1.21E-26
4.50E-01	- 3.00E-01	1.21E-21	7.56E-22	1.89E-22	4.59E-23	1.26E-23	3.66E-24	1.06E-24	9.27E-26	8.60E-27	8.54E-28
3.00E-01	- 1.50E-01	1.67E-22	1.07E-22	2.68E-23	6.23E-24	1.65E-24	4.43E-25	1.20E-25	9.36E-27	8.06E-28	7.43E-29
1.50E-01	- 1.00E-01	1.99E-24	1.19E-24	2.36E-25	4.25E-26	8.52E-27	1.73E-27	3.45E-28	1.47E-29	6.85E-31	3.42E-32
1.00E-01	- 7.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
7.00E-02	- 4.50E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.50E-02	- 3.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.00E-02	- 2.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.00E-02	- 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 30. Free-field neutron tissue dose source energy importance vs. ground range for a burst height of 278.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	8.19E-19	6.79E-19	4.39E-19	2.47E-19	1.23E-19	6.31E-20	3.25E-20	9.20E-21	3.03E-21	1.09E-21
1.22E+01 - 1.00E+01	8.14E-19	6.75E-19	4.38E-19	2.40E-19	1.23E-19	6.41E-20	3.31E-20	9.31E-21	3.01E-21	1.06E-21
1.00E+01 - 8.18E+00	8.35E-19	6.89E-19	4.50E-19	2.58E-19	1.30E-19	6.82E-20	3.58E-20	1.02E-20	3.38E-21	1.22E-21
8.18E+00 - 6.37E+00	8.30E-19	6.83E-19	4.47E-19	2.57E-19	1.31E-19	6.92E-20	3.71E-20	1.15E-20	4.23E-21	1.69E-21
6.37E+00 - 4.96E+00	8.18E-19	6.78E-19	4.46E-19	2.60E-19	1.36E-19	7.31E-20	4.04E-20	1.38E-20	6.09E-21	2.69E-21
4.96E+00 - 3.01E+00	7.71E-19	6.47E-19	4.22E-19	2.41E-19	1.25E-19	6.48E-20	3.47E-20	1.11E-20	4.56E-21	1.85E-21
3.01E+00 - 2.38E+00	8.39E-19	7.12E-19	4.59E-19	2.57E-19	1.31E-19	6.63E-20	3.45E-20	1.04E-20	3.99E-21	1.56E-21
2.38E+00 - 2.30E+00	9.10E-19	7.70E-19	4.97E-19	2.78E-19	1.38E-19	6.91E-20	3.49E-20	9.46E-21	3.02E-21	9.83E-22
2.30E+00 - 1.83E+00	8.56E-19	7.23E-19	4.70E-19	2.65E-19	1.31E-19	6.58E-20	3.30E-20	8.46E-21	2.41E-21	7.02E-22
1.83E+00 - 1.11E+00	7.88E-19	6.59E-19	4.10E-19	2.21E-19	1.05E-19	4.94E-20	2.38E-20	6.08E-21	1.84E-21	5.33E-22
1.11E+00 - 5.50E-01	6.06E-19	5.07E-19	3.07E-19	1.64E-19	7.66E-20	3.44E-20	1.64E-20	4.19E-21	1.38E-21	3.84E-22
5.50E-01 - 2.18E-02	4.26E-19	3.55E-19	2.11E-19	1.12E-19	5.08E-20	2.18E-20	1.00E-20	2.37E-21	7.32E-22	1.72E-22
2.18E-02 - 3.35E-03	6.59E-20	5.55E-20	2.80E-20	1.50E-20	5.49E-21	1.64E-21	5.16E-22	7.55E-22	2.12E-22	2.29E-23
3.35E-03 - 5.83E-04	1.53E-20	1.21E-20	5.15E-21	1.52E-21	3.81E-22	9.83E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 2.90E-05	1.41E-21	1.16E-21	5.18E-22	1.70E-22	4.52E-23	1.18E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 3.06E-06	7.80E-22	6.37E-22	2.82E-22	8.47E-23	1.93E-23	4.27E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 4.14E-07	5.23E-22	4.13E-22	1.66E-22	4.31E-23	8.09E-24	1.38E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	3.64E-22	2.75E-22	1.01E-22	2.41E-23	3.05E-24	5.59E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.00E-07 - 1.00E-07	2.38E-22	1.79E-22	6.43E-23	1.31E-23	1.90E-24	2.43E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	1.23E-22	9.05E-23	2.84E-23	4.76E-24	5.57E-25	6.07E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	5.94E-23	3.99E-23	1.16E-23	1.62E-24	1.67E-25	1.52E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.00E-07 - 1.00E-07	2.01E-23	1.38E-23	3.42E-24	4.43E-25	3.84E-26	2.97E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 31. Free-field gamma tissue dose source energy importance vs. ground range for a burst height of 278.00 meters.

		IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
NEUTRON ENERGY GROUP (MEV)											
1.50E+01 - 1.22E+01	1.04E-19	8.73E-20	6.03E-20	3.85E-20	2.14E-20	1.24E-20	7.40E-21	2.72E-21	1.07E-21	4.37E-22	
1.22E+01 - 1.00E+01	1.06E-19	8.88E-20	6.16E-20	3.92E-20	2.18E-20	1.27E-20	7.58E-21	2.78E-21	1.10E-21	4.44E-22	
1.00E+01 - 8.18E+00	9.63E-20	8.02E-20	5.63E-20	3.62E-20	2.00E-20	1.17E-20	6.98E-21	2.56E-21	1.01E-21	4.03E-22	
8.18E+00 - 6.37E+00	6.69E-20	5.57E-20	3.86E-20	2.45E-20	1.33E-20	7.63E-21	4.48E-21	1.58E-21	5.97E-22	2.30E-22	
6.37E+00 - 4.96E+00	3.65E-20	3.01E-20	2.04E-20	1.29E-20	6.83E-21	3.63E-21	2.22E-21	7.63E-22	2.78E-22	1.02E-22	
4.96E+00 - 4.06E+00	2.28E-20	1.88E-20	1.27E-20	8.02E-21	4.29E-21	2.45E-21	1.44E-21	5.05E-22	1.84E-22	6.77E-23	
4.06E+00 - 3.01E+00	1.99E-20	1.69E-20	1.17E-20	7.47E-21	4.28E-21	2.53E-21	1.52E-21	5.50E-22	2.00E-22	7.36E-23	
3.01E+00 - 2.38E+00	2.30E-20	1.95E-20	1.39E-20	9.19E-21	5.41E-21	3.26E-21	1.97E-21	7.09E-22	2.57E-22	9.39E-23	
2.38E+00 - 2.30E+00	2.42E-20	2.05E-20	1.49E-20	9.88E-21	5.69E-21	3.59E-21	2.16E-21	7.69E-22	2.75E-22	9.97E-23	
2.30E+00 - 1.83E+00	2.36E-20	2.08E-20	1.53E-20	9.92E-21	6.00E-21	3.60E-21	2.13E-21	7.34E-22	2.54E-22	9.07E-23	
1.83E+00 - 1.11E+00	2.44E-20	2.19E-20	1.59E-20	1.03E-20	6.19E-21	3.63E-21	2.10E-21	6.86E-22	2.30E-22	8.15E-23	
1.11E+00 - 5.50E-01	2.76E-20	2.49E-20	1.76E-20	1.11E-20	6.45E-21	3.61E-21	1.99E-21	6.14E-22	2.01E-22	7.21E-23	
5.50E-01 - 1.11E-01	3.18E-20	2.85E-20	1.93E-20	1.11E-20	5.97E-21	3.10E-21	1.59E-21	4.56E-22	1.52E-22	5.82E-23	
1.11E-01 - 2.18E-02	3.30E-20	2.90E-20	1.84E-20	9.57E-21	4.69E-21	2.26E-21	1.14E-21	3.42E-22	1.26E-22	5.17E-23	
2.18E-02 - 3.35E-03	3.14E-20	2.70E-20	1.61E-20	8.03E-21	3.73E-21	1.81E-21	9.35E-22	3.06E-22	1.19E-22	5.01E-23	
3.35E-03 - 5.83E-04	2.81E-20	2.39E-20	1.38E-20	6.59E-21	3.04E-21	1.52E-21	8.21E-22	2.87E-22	1.16E-22	4.97E-23	
5.83E-04 - 1.01E-04	2.42E-20	2.04E-20	1.15E-20	5.43E-21	2.61E-21	1.35E-21	7.56E-22	2.77E-22	1.15E-22	4.99E-23	
1.01E-04 - 2.90E-05	1.99E-20	1.67E-20	9.45E-21	4.60E-21	2.29E-21	1.24E-21	7.18E-22	2.70E-22	1.15E-22	5.05E-23	
2.90E-05 - 1.07E-05	1.69E-20	1.42E-20	8.10E-21	4.11E-21	2.15E-21	1.19E-21	6.87E-22	2.65E-22	1.16E-22	5.15E-23	
1.07E-05 - 3.66E-06	1.46E-20	1.23E-20	7.17E-21	3.81E-21	2.07E-21	1.15E-21	6.65E-22	2.62E-22	1.18E-22	5.23E-23	
3.66E-06 - 1.12E-06	1.24E-20	1.05E-20	6.34E-21	3.55E-21	1.98E-21	1.10E-21	6.43E-22	2.58E-22	1.21E-22	5.41E-23	
1.12E-06 - 4.14E-07	1.09E-20	9.40E-21	5.87E-21	3.39E-21	1.92E-21	1.06E-21	6.18E-22	2.51E-22	1.23E-22	5.51E-23	
4.14E-07 - 1.00E-07	1.00E-20	8.68E-21	5.52E-21	3.30E-21	1.89E-21	1.03E-21	6.02E-22	2.44E-22	1.25E-22	5.62E-23	
		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
GAMMA ENERGY GROUP (MEV)											
1.00E+01 - 8.00E+00	1.79E-19	1.49E-19	1.00E-19	6.29E-20	3.71E-20	2.31E-20	1.47E-20	5.89E-21	2.53E-21	1.25E-21	
8.00E+00 - 6.00E+00	1.42E-19	1.17E-19	7.80E-20	4.87E-20	2.80E-20	1.71E-20	1.06E-20	3.96E-21	1.63E-21	7.65E-22	
6.00E+00 - 5.00E+00	1.26E-19	1.04E-19	6.88E-20	4.24E-20	2.38E-20	1.42E-20	8.62E-21	3.05E-21	1.19E-21	5.27E-22	
5.00E+00 - 4.00E+00	1.06E-19	8.66E-20	5.71E-20	3.49E-20	1.92E-20	1.12E-20	6.62E-21	2.22E-21	8.26E-22	3.49E-22	
4.00E+00 - 3.00E+00	8.23E-20	6.72E-20	4.39E-20	2.66E-20	1.42E-20	7.99E-21	4.57E-21	1.43E-21	5.01E-22	1.97E-22	
3.00E+00 - 2.50E+00	6.48E-20	5.29E-20	3.43E-20	2.05E-20	1.05E-20	5.74E-21	3.16E-21	9.04E-22	2.89E-22	1.03E-22	
2.50E+00 - 2.00E+00	5.37E-20	4.38E-20	2.81E-20	1.66E-20	8.22E-21	4.32E-21	2.29E-21	6.10E-22	1.83E-22	6.03E-23	
2.00E+00 - 1.50E+00	4.26E-20	3.46E-20	2.19E-20	1.26E-20	6.00E-21	2.99E-21	1.51E-21	3.65E-22	1.00E-22	2.94E-23	
1.50E+00 - 1.00E+00	3.21E-20	2.61E-20	1.61E-20	8.87E-21	3.97E-21	1.83E-21	8.54E-22	1.81E-22	4.38E-23	1.08E-23	
1.00E+00 - 7.00E-01	2.26E-20	1.84E-20	1.09E-20	5.70E-21	2.37E-21	9.96E-22	4.21E-22	7.39E-23	1.44E-23	2.76E-24	
7.00E-01 - 4.50E-01	1.61E-20	1.31E-20	7.51E-21	3.67E-21	1.43E-21	5.49E-22	2.12E-22	3.13E-23	4.96E-24	7.53E-25	
4.50E-01 - 3.00E-01	1.16E-20	8.95E-21	4.96E-21	2.22E-21	7.99E-22	2.82E-22	9.90E-23	1.18E-23	1.44E-24	1.70E-25	
3.00E-01 - 1.50E-01	6.83E-21	5.55E-21	2.95E-21	1.23E-21	4.14E-22	1.35E-22	4.35E-23	4.42E-24	4.51E-25	4.50E-26	
1.50E-01 - 1.00E-01	3.31E-21	2.63E-21	1.29E-21	4.66E-22	1.80E-22	3.51E-22	9.20E-24	5.96E-25	3.71E-26	2.23E-27	
1.00E-01 - 7.00E-02	1.94E-21	1.52E-21	7.00E-22	2.29E-22	5.80E-23	1.38E-23	3.23E-24	1.66E-25	8.15E-27	3.91E-28	
7.00E-02 - 4.50E-02	1.02E-21	7.81E-22	3.35E-22	9.83E-23	2.14E-23	4.51E-24	9.01E-25	3.74E-26	1.50E-27	6.06E-29	
4.50E-02 - 3.00E-02	1.46E-22	1.04E-22	3.35E-23	6.11E-24	7.71E-25	8.22E-26	8.64E-27	8.45E-29	7.76E-31	7.19E-33	
3.00E-02 - 2.00E-02	3.49E-25	2.05E-25	2.91E-26	1.59E-27	4.26E-29	7.43E-31	1.03E-32	1.33E-36	2.08E-39	2.13E-39	
2.00E-02 - 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	

Table 32. Armor shielded neutron tissue dose source energy importance vs. ground range for a burst height of 278.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	GROUND RANGE (METERS)			500.00	600.00	800.00	1000.00
1.50E+01 - 1.22E+01	6.62E-19	5.52E-19	3.55E-19	1.97E-19	9.61E-20	4.74E-20	2.33E-20	5.83E-21	1.65E-21	5.22E-22
1.22E+01 - 1.00E+01	6.54E-19	5.45E-19	3.52E-19	1.96E-19	9.63E-20	4.79E-20	2.37E-20	5.96E-21	1.68E-21	5.23E-22
1.00E+01 - 8.18E+00	6.72E-19	5.57E-19	3.63E-19	2.05E-19	1.01E-19	5.13E-20	2.58E-20	6.61E-21	1.90E-21	6.10E-22
8.18E+00 - 6.37E+00	6.74E-19	5.59E-19	3.63E-19	2.05E-19	1.01E-19	5.14E-20	2.60E-20	6.93E-21	2.16E-21	7.58E-22
6.37E+00 - 4.96E+00	6.92E-19	5.78E-19	3.76E-19	2.12E-19	1.05E-19	5.34E-20	2.72E-20	7.66E-21	2.71E-21	1.07E-21
4.96E+00 - 4.06E+00	6.78E-19	5.72E-19	3.67E-19	2.01E-19	9.78E-20	4.77E-20	2.34E-20	6.11E-21	2.00E-21	7.16E-22
4.06E+00 - 3.01E+00	7.59E-19	6.43E-19	4.03E-19	2.13E-19	1.01E-19	4.74E-20	2.25E-20	5.55E-21	1.71E-21	5.69E-22
3.01E+00 - 2.38E+00	8.01E-19	6.73E-19	4.19E-19	2.21E-19	1.02E-19	4.74E-20	2.21E-20	5.04E-21	1.34E-21	3.88E-22
2.38E+00 - 2.30E+00	7.29E-19	6.10E-19	3.83E-19	2.05E-19	9.48E-20	4.46E-20	2.09E-20	4.63E-21	1.15E-21	3.08E-22
2.30E+00 - 1.83E+00	6.55E-19	5.39E-19	3.19E-19	1.58E-19	6.76E-20	2.93E-20	1.29E-20	2.75E-21	7.07E-22	1.88E-22
1.83E+00 - 1.11E+00	4.67E-19	3.80E-19	2.18E-19	1.04E-19	4.35E-20	1.81E-20	7.88E-21	1.75E-21	4.90E-22	1.30E-22
1.11E+00 - 5.50E-01	2.92E-19	2.36E-19	1.33E-19	6.38E-20	2.65E-20	1.07E-20	4.59E-21	9.93E-22	2.79E-22	6.76E-23
5.50E-01 - 1.11E-01	1.06E-19	8.72E-20	4.73E-20	2.28E-20	9.57E-21	3.56E-21	1.51E-21	3.02E-22	9.08E-23	1.70E-23
1.11E-01 - 2.13E-02	4.21E-20	3.48E-20	1.64E-20	5.83E-21	1.80E-21	5.65E-22	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.13E-02 - 3.35E-03	1.14E-20	8.93E-21	3.69E-21	1.03E-21	2.55E-22	6.04E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	3.35E-22	2.64E-22	1.06E-22	3.07E-23	6.96E-24	1.56E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	1.06E-22	3.26E-23	3.33E-23	9.11E-24	1.82E-24	3.73E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	5.06E-23	3.79E-23	1.41E-23	3.40E-24	5.39E-25	8.44E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	2.01E-23	2.08E-23	7.03E-24	1.34E-24	1.93E-25	2.57E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	1.48E-23	1.10E-23	3.40E-24	6.05E-25	7.97E-26	9.19E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	4.54E-24	3.28E-24	9.24E-25	1.34E-25	1.46E-26	1.36E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	1.30E-24	9.17E-25	2.40E-25	3.25E-26	3.01E-27	2.41E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.06E-07	2.44E-25	1.68E-25	4.18E-26	5.22E-27	4.70E-28	3.59E-29	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 33. Armor shielded gamma tissue dose source energy importance
vs. ground range for a burst height of 278.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
	GROUND RANGE (METERS)									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	8.32E-20	7.60E-20	4.79E-20	3.07E-20	1.73E-20	9.33E-21	5.54E-21	1.90E-21	6.94E-22	2.48E-22
1.22E+01 - 1.00E+01	8.59E-20	7.77E-20	4.99E-20	3.15E-20	1.74E-20	9.67E-21	5.78E-21	1.97E-21	7.32E-22	2.59E-22
1.00E+01 - 8.18E+00	8.74E-20	8.10E-20	5.27E-20	3.25E-20	1.82E-20	9.86E-21	5.92E-21	2.06E-21	7.84E-22	2.75E-22
8.18E+00 - 6.37E+00	6.20E-20	4.89E-20	2.85E-20	1.40E-20	5.90E-21	2.74E-21	1.31E-21	3.56E-22	1.36E-22	5.32E-23
6.37E+00 - 4.96E+00	5.53E-20	4.23E-20	2.44E-20	1.18E-20	4.66E-21	2.02E-21	8.65E-22	1.66E-22	6.14E-23	2.29E-23
4.96E+00 - 4.06E+00	5.80E-20	4.38E-20	2.60E-20	1.32E-20	5.30E-21	2.43E-21	1.10E-21	2.13E-22	4.98E-23	1.62E-23
4.06E+00 - 3.01E+00	5.92E-20	4.53E-20	2.82E-20	1.54E-20	7.02E-21	3.64E-21	1.94E-21	6.06E-22	2.40E-22	1.04E-22
3.01E+00 - 2.38E+00	8.75E-20	7.18E-20	4.74E-20	2.80E-20	1.51E-20	8.51E-21	4.94E-21	1.88E-21	9.60E-22	4.23E-22
2.38E+00 - 2.30E+00	8.60E-20	7.14E-20	4.66E-20	2.78E-20	1.43E-20	7.76E-21	4.35E-21	1.54E-21	6.91E-22	3.00E-22
2.30E+00 - 1.83E+00	1.01E-19	8.46E-20	5.43E-20	3.04E-20	1.57E-20	8.15E-21	4.38E-21	1.42E-21	5.96E-22	2.39E-22
1.83E+00 - 1.11E+00	1.23E-19	1.01E-19	6.48E-20	3.56E-20	1.74E-20	8.67E-21	4.41E-21	1.24E-21	4.22E-22	1.48E-22
1.11E+00 - 3.50E-01	1.27E-19	1.04E-19	6.70E-20	3.69E-20	1.73E-20	8.63E-21	4.27E-21	1.08E-21	3.10E-22	9.42E-23
3.50E-01 - 1.11E-01	1.19E-19	9.75E-20	5.93E-20	3.05E-20	1.38E-20	6.34E-21	2.98E-21	7.43E-22	2.30E-22	7.04E-23
1.11E-01 - 2.18E-02	9.53E-20	7.76E-20	4.55E-20	2.26E-20	9.95E-21	4.29E-21	1.97E-21	4.93E-22	1.67E-22	5.00E-23
2.18E-02 - 3.35E-03	7.44E-20	5.95E-20	3.40E-20	1.64E-20	6.94E-21	2.84E-21	1.26E-21	2.99E-22	9.92E-23	2.76E-23
3.35E-03 - 5.83E-04	3.70E-20	3.03E-20	1.62E-20	7.68E-21	3.23E-21	1.21E-21	5.41E-22	1.29E-22	4.73E-23	1.31E-23
5.83E-04 - 1.01E-04	9.89E-20	8.50E-20	4.96E-20	2.32E-20	9.34E-21	3.86E-21	1.92E-22	7.03E-23	2.91E-23	1.27E-23
1.01E-04 - 2.90E-05	8.78E-20	7.43E-20	3.93E-20	1.67E-20	5.67E-21	2.02E-21	1.82E-22	6.85E-23	2.91E-23	1.29E-23
2.90E-05 - 1.07E-05	7.27E-20	5.96E-20	3.00E-20	1.08E-20	3.28E-21	1.04E-21	1.75E-22	6.75E-23	2.94E-23	1.31E-23
1.07E-05 - 3.06E-06	5.62E-20	4.60E-20	2.09E-20	6.72E-21	1.88E-21	5.95E-22	1.70E-22	6.65E-23	2.96E-23	1.32E-23
3.06E-06 - 1.12E-06	4.01E-20	3.15E-20	1.37E-20	3.90E-21	1.06E-21	3.82E-22	1.64E-22	6.54E-23	3.02E-23	1.36E-23
1.12E-06 - 4.14E-07	2.85E-20	2.20E-20	8.65E-21	7.55E-22	3.10E-22	1.59E-22	1.59E-22	6.37E-23	3.05E-23	1.39E-23
4.14E-07 - 1.00E-07	1.94E-20	1.51E-20	6.10E-21	1.71E-21	6.05E-22	2.80E-22	1.55E-22	6.19E-23	3.10E-23	1.41E-23
GAMMA ENERGY GROUP (MEV)	GROUND RANGE (METERS)									
	GROUND RANGE (METERS)									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01 - 8.00E+00	4.82E-20	4.01E-20	2.67E-20	1.65E-20	9.90E-21	6.15E-21	3.91E-21	1.57E-21	6.85E-22	3.38E-22
8.00E+00 - 6.00E+00	3.67E-20	3.19E-20	2.10E-20	1.28E-20	7.50E-21	4.56E-21	2.83E-21	1.67E-21	4.38E-22	2.04E-22
6.00E+00 - 5.00E+00	3.40E-20	2.80E-20	1.82E-20	1.10E-20	6.25E-21	3.71E-21	2.24E-21	7.96E-22	3.09E-22	1.36E-22
5.00E+00 - 4.00E+00	2.64E-20	2.17E-20	1.40E-20	8.32E-21	4.64E-21	2.69E-21	1.59E-21	5.34E-22	1.98E-22	8.28E-23
4.00E+00 - 3.00E+00	1.88E-20	1.54E-20	9.78E-21	5.73E-21	3.08E-21	1.73E-21	9.85E-22	3.08E-22	1.07E-22	4.16E-23
3.00E+00 - 2.50E+00	1.31E-20	1.07E-20	6.71E-21	3.86E-21	1.99E-21	1.07E-21	5.86E-22	1.67E-22	5.26E-23	1.86E-23
2.50E+00 - 2.00E+00	9.12E-21	7.39E-21	4.58E-21	2.60E-21	1.29E-21	6.72E-22	3.53E-22	9.31E-23	2.75E-23	8.96E-24
2.00E+00 - 1.50E+00	5.63E-21	4.53E-21	2.77E-21	1.54E-21	7.24E-22	3.58E-22	1.79E-22	4.26E-23	1.15E-23	3.38E-24
1.50E+00 - 1.00E+00	2.91E-21	2.33E-21	1.38E-21	7.36E-22	3.24E-22	1.47E-22	6.81E-23	1.41E-23	3.41E-24	8.52E-25
1.00E+00 - 7.00E-01	1.08E-21	8.55E-22	4.91E-22	2.50E-22	1.00E-22	4.12E-23	1.71E-23	2.88E-24	5.64E-25	1.10E-25
7.00E-01 - 4.50E-01	4.01E-22	3.16E-22	1.75E-22	8.37E-23	3.10E-23	1.14E-23	4.31E-24	6.05E-25	9.94E-26	1.54E-26
4.50E-01 - 3.00E-01	1.06E-22	8.21E-23	4.30E-23	1.88E-23	6.26E-24	2.02E-24	6.76E-25	7.41E-26	9.17E-27	1.04E-27
3.00E-01 - 1.50E-01	1.54E-23	1.23E-23	6.31E-24	2.66E-24	8.39E-25	2.63E-25	8.33E-26	8.29E-27	8.47E-28	8.38E-29
1.50E-01 - 1.00E-01	1.20E-23	9.24E-24	4.24E-24	1.49E-24	3.57E-25	8.54E-26	2.08E-26	1.19E-26	6.87E-27	3.74E-27
1.00E-01 - 7.00E-02	0.90E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
7.00E-02 - 4.50E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.50E-02 - 3.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.00E-02 - 2.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.00E-02 - 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 34. Free-field neutron tissue dose source energy importance
vs. ground range for a burst height of 476.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	1.59E-19	1.47E-19	1.12E-19	7.86E-20	5.11E-20	3.17E-20	1.85E-20	6.27E-21	2.21E-21	8.25E-22
1.22E+01 - 1.00E+01	1.61E-19	1.49E-19	1.14E-19	8.00E-20	5.21E-20	3.24E-20	1.88E-20	6.37E-21	2.23E-21	8.14E-22
1.00E+01 - 8.18E+00	1.70E-19	1.58E-19	1.20E-19	8.50E-20	5.58E-20	3.51E-20	2.03E-20	7.10E-21	2.56E-21	9.52E-22
8.18E+00 - 6.37E+00	1.69E-19	1.57E-19	1.20E-19	8.53E-20	5.68E-20	3.63E-20	2.18E-20	7.96E-21	3.05E-21	1.25E-21
6.37E+00 - 4.96E+00	1.70E-19	1.62E-19	1.23E-19	8.85E-20	6.05E-20	3.94E-20	2.53E-20	9.53E-21	3.85E-21	1.70E-21
4.96E+00 - 4.06E+00	1.56E-19	1.49E-19	1.12E-19	7.98E-20	5.37E-20	3.40E-20	2.14E-20	7.48E-21	2.79E-21	1.14E-21
4.06E+00 - 3.01E+00	1.63E-19	1.56E-19	1.17E-19	8.22E-20	5.45E-20	3.37E-20	2.08E-20	6.83E-21	2.37E-21	8.99E-22
3.01E+00 - 2.38E+00	1.77E-19	1.66E-19	1.25E-19	8.68E-20	5.65E-20	3.45E-20	2.00E-20	6.17E-21	1.95E-21	6.49E-22
2.38E+00 - 2.30E+00	1.71E-19	1.60E-19	1.21E-19	8.35E-20	5.41E-20	3.29E-20	1.84E-20	5.57E-21	1.67E-21	5.60E-22
2.30E+00 - 1.83E+00	1.32E-19	1.25E-19	9.05E-20	6.13E-20	3.95E-20	2.33E-20	1.32E-20	3.66E-21	1.04E-21	3.17E-22
1.83E+00 - 1.11E+00	9.26E-20	9.03E-20	6.24E-20	4.20E-20	2.60E-20	1.60E-20	9.38E-21	2.30E-21	6.48E-22	1.88E-22
1.11E+00 - 5.50E-01	6.10E-20	6.08E-20	4.02E-20	2.68E-20	1.79E-20	9.86E-21	5.74E-21	1.27E-21	3.03E-22	7.01E-23
5.50E-01 - 1.11E-01	2.63E-20	2.77E-20	1.67E-20	1.09E-20	7.52E-21	3.96E-21	2.24E-21	3.49E-22	4.58E-23	0.00E-01
1.11E-01 - 2.18E-02	6.40E-21	7.05E-21	3.62E-21	2.12E-21	1.49E-21	5.71E-22	2.04E-22	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	8.14E-22	7.11E-22	4.36E-22	2.04E-22	7.73E-23	2.71E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 3.63E-04	9.48E-23	8.27E-23	5.10E-23	2.35E-23	8.84E-24	3.10E-24	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.63E-04 - 1.01E-04	4.20E-23	3.64E-23	2.17E-23	9.18E-24	3.14E-24	9.38E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	1.71E-23	1.50E-23	8.13E-24	3.34E-24	9.83E-25	2.50E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	6.07E-24	6.95E-24	3.54E-24	1.35E-24	3.78E-25	7.60E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	4.12E-24	3.29E-24	1.68E-24	5.92E-25	1.52E-25	3.03E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	1.18E-24	9.24E-25	4.75E-25	1.50E-25	3.14E-26	5.34E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	3.36E-25	2.76E-25	1.26E-25	3.65E-26	7.42E-27	1.13E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	7.90E-26	6.22E-26	2.72E-26	7.40E-27	1.29E-27	1.90E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 35. Free-field gamma tissue dose source energy importance vs. ground range for a burst height of 476.00 meters.

		IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
NEUTRON ENERGY GROUP (MEV)											
1.50E+01	- 1.22E+01	2.70E-20	2.61E-20	2.62E-20	1.52E-20	1.10E-20	7.46E-21	4.89E-21	2.03E-21	8.68E-22	3.71E-22
1.22E+01	- 1.00E+01	2.78E-20	2.67E-20	2.07E-20	1.56E-20	1.13E-20	7.67E-21	5.02E-21	2.08E-21	8.85E-22	3.78E-22
1.00E+01	- 8.18E+00	2.57E-20	2.47E-20	1.92E-20	1.45E-20	1.05E-20	7.15E-21	4.66E-21	1.97E-21	8.14E-22	3.44E-22
8.10E+00	- 6.37E+00	1.72E-20	1.66E-20	1.27E-20	9.54E-21	6.82E-21	4.61E-21	2.95E-21	1.17E-21	4.79E-22	1.95E-22
6.37E+00	- 4.96E+00	8.93E-21	8.67E-21	6.54E-21	4.87E-21	3.47E-21	2.34E-21	1.47E-21	5.68E-22	2.24E-22	8.76E-23
4.96E+00	- 4.06E+00	5.56E-21	5.39E-21	4.14E-21	3.09E-21	2.22E-21	1.49E-21	9.60E-22	3.81E-22	1.51E-22	5.94E-23
4.06E+00	- 3.01E+00	5.45E-21	5.25E-21	4.20E-21	3.19E-21	2.31E-21	1.57E-21	1.03E-21	4.23E-22	1.68E-22	6.59E-23
3.01E+00	- 2.38E+00	6.99E-21	6.71E-21	5.42E-21	4.15E-21	3.01E-21	2.06E-21	1.35E-21	5.47E-22	2.16E-22	8.42E-23
2.38E+00	- 2.30E+00	7.67E-21	7.31E-21	5.95E-21	4.56E-21	3.29E-21	2.25E-21	1.47E-21	5.93E-22	2.32E-22	8.94E-23
2.30E+00	- 1.83E+00	7.60E-21	7.29E-21	5.98E-21	4.55E-21	3.24E-21	2.18E-21	1.41E-21	5.55E-22	2.12E-22	8.10E-23
1.83E+00	- 1.11E+00	7.81E-21	7.46E-21	6.14E-21	4.61E-21	3.21E-21	2.13E-21	1.34E-21	5.11E-22	1.90E-22	7.25E-23
1.11E+00	- 5.50E-01	8.19E-21	7.78E-21	6.32E-21	4.62E-21	3.14E-21	1.99E-21	1.23E-21	4.47E-22	1.64E-22	6.37E-23
5.50E-01	- 1.11E-01	7.72E-21	7.26E-21	5.74E-21	4.03E-21	2.56E-21	1.55E-21	9.23E-22	3.25E-22	1.22E-22	5.09E-23
1.11E-01	- 2.10E-02	6.12E-21	5.71E-21	4.38E-21	2.93E-21	1.81E-21	1.07E-21	6.43E-22	2.41E-22	9.91E-23	4.35E-23
2.10E-02	- 3.33E-03	4.79E-21	4.46E-21	3.39E-21	2.24E-21	1.40E-21	8.53E-22	5.30E-22	2.11E-22	9.00E-23	4.05E-23
3.33E-03	- 5.83E-04	3.77E-21	3.50E-21	2.67E-21	1.81E-21	1.17E-21	7.45E-22	4.75E-22	1.98E-22	8.43E-23	3.83E-23
5.83E-04	- 1.01E-04	3.11E-21	2.90E-21	2.22E-21	1.56E-21	1.04E-21	6.85E-22	4.45E-22	1.87E-22	7.97E-23	3.66E-23
1.01E-04	- 2.90E-05	2.60E-21	2.52E-21	1.96E-21	1.40E-21	9.29E-22	6.50E-22	4.27E-22	1.79E-22	7.52E-23	3.50E-23
2.90E-05	- 1.07E-05	2.48E-21	2.35E-21	1.83E-21	1.32E-21	9.29E-22	6.26E-22	4.20E-22	1.73E-22	7.26E-23	3.39E-23
1.07E-05	- 3.06E-06	2.38E-21	2.27E-21	1.75E-21	1.27E-21	9.02E-22	6.13E-22	4.15E-22	1.69E-22	7.03E-23	3.30E-23
3.06E-06	- 1.12E-06	2.25E-21	2.20E-21	1.67E-21	1.23E-21	8.83E-22	5.99E-22	4.15E-22	1.66E-22	6.80E-23	3.20E-23
1.12E-06	- 4.14E-07	2.16E-21	2.13E-21	1.61E-21	1.18E-21	8.60E-22	5.85E-22	4.10E-22	1.60E-22	6.60E-23	3.09E-23
4.14E-07	- 1.00E-07	2.09E-21	2.15E-21	1.56E-21	1.16E-21	8.55E-22	5.74E-22	4.14E-22	1.57E-22	6.56E-23	3.06E-23
		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
GAMMA ENERGY GROUP (MEV)											
1.00E+01	- 8.00E+00	4.50E-20	4.19E-20	3.26E-20	2.48E-20	1.81E-20	1.31E-20	8.87E-21	4.23E-21	2.18E-21	1.06E-21
8.00E+00	- 6.00E+00	3.44E-20	3.19E-20	2.45E-20	1.85E-20	1.33E-20	9.56E-21	6.30E-21	2.86E-21	1.41E-21	6.41E-22
6.00E+00	- 5.00E+00	2.93E-20	2.71E-20	2.07E-20	1.55E-20	1.10E-20	7.80E-21	5.01E-21	2.17E-21	1.01E-21	4.37E-22
5.00E+00	- 4.00E+00	2.36E-20	2.19E-20	1.66E-20	1.23E-20	8.63E-21	6.05E-21	3.79E-21	1.56E-21	6.92E-22	2.83E-22
4.00E+00	- 3.00E+00	1.76E-20	1.63E-20	1.22E-20	8.89E-21	6.18E-21	4.24E-21	2.59E-21	9.87E-22	4.06E-22	1.53E-22
3.00E+00	- 2.50E+00	1.32E-20	1.22E-20	9.01E-21	6.49E-21	4.44E-21	2.96E-21	1.74E-21	6.15E-22	2.32E-22	7.98E-23
2.50E+00	- 2.00E+00	1.04E-20	9.62E-21	7.01E-21	4.97E-21	3.35E-21	2.17E-21	1.24E-21	4.06E-22	1.41E-22	4.47E-23
2.00E+00	- 1.50E+00	7.62E-21	7.11E-21	5.09E-21	3.54E-21	2.33E-21	1.45E-21	7.97E-22	2.85E-22	7.23E-23	2.07E-23
1.50E+00	- 1.00E+00	5.10E-21	4.80E-21	3.34E-21	2.25E-21	1.43E-21	8.41E-22	4.36E-22	1.10E-22	2.88E-23	7.14E-24
1.00E+00	- 7.00E-01	3.11E-21	2.91E-21	1.99E-21	1.28E-21	7.71E-22	4.17E-22	2.00E-22	4.23E-23	8.89E-24	1.60E-24
7.00E-01	- 4.50E-01	1.91E-21	1.78E-21	1.20E-21	7.38E-22	4.21E-22	2.09E-22	9.41E-23	1.67E-23	2.91E-24	4.91E-25
4.50E-01	- 3.00E-01	1.11E-21	1.02E-21	6.77E-22	4.00E-22	2.11E-22	9.69E-23	3.99E-23	5.91E-24	8.27E-25	1.12E-25
3.00E-01	- 1.50E-01	5.84E-22	5.33E-22	3.50E-22	1.98E-22	9.81E-23	4.18E-23	1.64E-23	2.10E-24	2.57E-25	2.99E-26
1.50E-01	- 1.00E-01	1.91E-22	1.71E-22	1.06E-22	5.52E-23	2.42E-23	8.85E-24	2.81E-24	2.41E-25	1.87E-26	1.33E-27
1.00E-01	- 7.00E-02	8.51E-23	7.52E-23	4.55E-23	2.24E-23	9.17E-24	3.07E-24	9.00E-25	6.27E-26	3.89E-27	2.24E-28
7.00E-02	- 4.50E-02	3.11E-23	2.72E-23	1.58E-23	7.25E-24	2.80E-24	8.88E-25	2.29E-25	1.31E-26	6.87E-28	3.36E-29
4.50E-02	- 3.00E-02	9.55E-25	8.17E-25	4.17E-25	1.43E-25	3.93E-26	7.17E-27	1.12E-27	1.85E-29	2.50E-31	3.02E-33
3.00E-02	- 2.00E-02	4.48E-29	2.79E-29	9.61E-30	1.51E-30	1.42E-31	7.41E-33	2.25E-34	1.32E-37	2.13E-39	2.62E-39
2.00E-02	- 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 36. Armor shielded neutron tissue dose source energy importance
vs. ground range for a burst height of 476.00 meters.

NEUTRON ENERGY GROUP (NEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	1.26E-19	1.17E-19	8.64E-20	6.08E-20	3.84E-20	2.29E-20	1.27E-20	3.88E-21	1.22E-21	4.01E-22
1.22E+01 - 1.00E+01	1.27E-19	1.18E-19	8.91E-20	6.15E-20	3.90E-20	2.34E-20	1.30E-20	3.99E-21	1.25E-21	4.06E-22
1.00E+01 - 8.18E+00	1.35E-19	1.25E-19	9.44E-20	6.57E-20	4.20E-20	2.56E-20	1.43E-20	4.48E-21	1.45E-21	4.78E-22
8.18E+00 - 6.37E+00	1.34E-19	1.25E-19	9.41E-20	6.55E-20	4.20E-20	2.57E-20	1.45E-20	4.69E-21	1.59E-21	5.70E-22
6.37E+00 - 4.96E+00	1.37E-19	1.28E-19	9.67E-20	6.74E-20	4.35E-20	2.66E-20	1.55E-20	5.15E-21	1.82E-21	7.09E-22
4.96E+00 - 4.06E+00	1.27E-19	1.19E-19	8.91E-20	6.10E-20	3.85E-20	2.28E-20	1.30E-20	4.00E-21	1.29E-21	4.63E-22
4.06E+00 - 3.01E+00	1.30E-19	1.21E-19	9.01E-20	6.07E-20	3.77E-20	2.18E-20	1.21E-20	3.53E-21	1.08E-21	3.59E-22
3.01E+00 - 2.38E+00	1.33E-19	1.23E-19	9.09E-20	6.07E-20	3.73E-20	2.15E-20	1.14E-20	3.16E-21	8.91E-22	2.61E-22
2.38E+00 - 2.30E+00	1.26E-19	1.16E-19	8.58E-20	5.75E-20	3.55E-20	2.06E-20	1.08E-20	2.94E-21	8.07E-22	2.16E-22
2.30E+00 - 1.83E+00	8.63E-20	7.96E-20	5.67E-20	3.66E-20	2.19E-20	1.21E-20	6.23E-21	1.58E-21	4.09E-22	1.13E-22
1.83E+00 - 1.11E+00	5.24E-20	4.94E-20	3.40E-20	2.18E-20	1.32E-20	7.24E-21	3.90E-21	9.35E-22	2.37E-22	6.66E-23
1.11E+00 - 5.50E-01	3.03E-20	2.98E-20	1.97E-20	1.26E-20	7.84E-21	4.24E-21	2.31E-21	5.07E-22	1.20E-22	3.06E-23
5.50E-01 - 1.11E-01	1.02E-20	1.07E-20	6.37E-21	4.10E-21	2.69E-21	1.38E-21	8.16E-22	1.43E-22	2.69E-23	3.76E-24
1.11E-01 - 2.18E-02	3.66E-21	3.31E-21	2.09E-21	1.09E-21	4.56E-22	1.90E-22	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	3.34E-22	4.62E-22	2.83E-22	1.30E-22	4.58E-23	1.63E-23	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	1.52E-23	1.29E-23	7.48E-24	3.44E-24	1.18E-24	3.86E-25	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	4.67E-24	3.47E-24	2.02E-24	8.62E-25	2.63E-25	7.45E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	1.22E-24	1.04E-24	5.49E-25	2.10E-25	5.63E-26	1.29E-26	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	4.48E-25	3.76E-25	1.92E-25	6.71E-26	1.72E-26	3.50E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	1.82E-25	1.46E-25	7.68E-26	2.42E-26	5.60E-27	1.11E-27	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	3.23E-26	2.53E-26	1.23E-26	3.68E-27	7.54E-28	1.24E-28	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	6.54E-27	5.11E-27	2.37E-27	6.69E-28	1.23E-28	1.80E-29	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	9.55E-28	7.57E-28	3.29E-28	9.19E-29	1.69E-29	2.38E-30	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 37. Armor shielded gamma tissue dose source energy importance vs. ground range for a burst height of 476.00 meters.

NEUTRON ENERGY GROUP (MEV)		IMPORTANCE (RADS/SOURCE PARTICLE/CHOUF) AT 1.75 METERS ABOVE GROUND									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01	- 1.22E+01	2.10E-20	2.11E-20	1.54E-20	1.20E-20	8.75E-21	5.54E-21	3.72E-21	1.42E-21	5.49E-22	2.14E-22
1.22E+01	- 1.00E+01	2.17E-20	2.20E-20	1.64E-20	1.26E-20	8.95E-21	6.01E-21	4.02E-21	1.48E-21	5.75E-22	2.23E-22
1.00E+01	- 8.18E+00	2.22E-20	2.28E-20	1.59E-20	1.28E-20	8.80E-21	5.93E-21	4.27E-21	1.54E-21	5.97E-22	2.33E-22
8.18E+00	- 6.37E+00	8.16E-21	7.38E-21	5.24E-21	3.47E-21	2.13E-21	1.26E-21	6.77E-22	2.64E-22	1.09E-22	4.49E-23
6.37E+00	- 4.96E+00	6.72E-21	5.97E-21	4.11E-21	2.61E-21	1.59E-21	8.28E-22	4.93E-22	1.24E-22	4.97E-23	1.97E-23
4.96E+00	- 4.06E+00	7.78E-21	6.89E-21	4.76E-21	3.12E-21	1.83E-21	1.07E-21	4.93E-22	1.26E-22	3.61E-23	1.43E-23
4.06E+00	- 3.01E+00	9.62E-21	8.78E-21	6.39E-21	4.48E-21	2.92E-21	1.88E-21	1.10E-21	4.19E-22	1.71E-22	7.46E-23
3.01E+00	- 2.38E+00	1.86E-20	1.80E-20	1.35E-20	9.95E-21	7.60E-21	4.69E-21	3.17E-21	1.31E-21	5.66E-22	2.65E-22
2.38E+00	- 2.30E+00	1.76E-20	1.71E-20	1.23E-20	9.26E-21	6.38E-21	4.14E-21	2.73E-21	1.05E-21	4.18E-22	1.81E-22
2.30E+00	- 1.83E+00	1.93E-20	1.86E-20	1.39E-20	9.46E-21	6.65E-21	4.16E-21	2.68E-21	9.40E-22	3.47E-22	1.41E-22
1.83E+00	- 1.11E+00	2.25E-20	2.11E-20	1.57E-20	1.09E-20	7.04E-21	4.30E-21	2.50E-21	7.99E-22	2.65E-22	9.42E-23
1.11E+00	- 5.50E-01	2.36E-20	2.19E-20	1.62E-20	1.11E-20	7.07E-21	4.24E-21	2.33E-21	6.93E-22	2.10E-22	6.50E-23
5.50E-01	- 1.11E-01	1.74E-20	1.63E-20	1.17E-20	7.77E-21	4.86E-21	2.80E-21	1.50E-21	4.30E-22	1.24E-22	4.00E-23
1.11E-01	- 2.18E-02	1.17E-20	1.13E-20	7.69E-21	5.05E-21	3.19E-21	1.80E-21	1.04E-21	2.63E-22	7.39E-23	2.36E-23
2.18E-02	- 3.35E-03	7.93E-21	7.83E-21	5.66E-21	3.27E-21	2.08E-21	1.13E-21	6.53E-22	1.51E-22	3.98E-23	1.21E-23
3.35E-03	- 5.83E-04	3.29E-21	3.52E-21	2.04E-21	1.32E-21	8.90E-22	4.73E-22	3.00E-22	6.38E-23	2.14E-23	9.79E-24
5.83E-04	- 1.01E-04	1.71E-20	1.56E-20	1.11E-20	6.33E-21	3.19E-21	1.51E-21	1.10E-22	4.69E-23	2.03E-23	9.36E-24
1.01E-04	- 2.90E-05	1.11E-20	9.98E-21	6.58E-21	3.54E-21	1.58E-21	7.23E-22	1.06E-22	4.52E-23	1.93E-23	8.94E-24
2.90E-05	- 1.07E-05	6.34E-21	5.66E-21	3.66E-21	1.82E-21	8.03E-22	3.54E-22	1.04E-22	4.39E-23	1.86E-23	8.69E-24
1.07E-05	- 3.06E-06	3.48E-21	3.06E-21	1.93E-21	9.57E-22	4.40E-22	2.19E-22	1.02E-22	4.29E-23	1.80E-23	8.43E-24
3.06E-06	- 1.12E-06	1.79E-21	1.59E-21	1.03E-21	5.34E-22	2.86E-22	1.64E-22	1.02E-22	4.18E-23	1.75E-23	8.18E-24
1.12E-06	- 4.14E-07	1.09E-21	1.00E-21	6.64E-22	3.85E-22	2.37E-22	1.48E-22	1.01E-22	4.08E-23	1.69E-23	7.93E-24
4.14E-07	- 1.00E-07	7.87E-22	7.53E-22	5.06E-22	3.28E-22	2.19E-22	1.42E-22	1.01E-22	4.01E-23	1.68E-23	7.81E-24
GAMMA ENERGY GROUP (MEV)		IMPORTANCE (RADS/SOURCE PARTICLE/CHOUF) AT 1.75 METERS ABOVE GROUND									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01	- 8.60E+00	1.18E-20	1.11E-20	8.63E-21	6.53E-21	4.73E-21	3.40E-21	2.35E-21	1.13E-21	5.78E-22	2.84E-22
8.60E+00	- 6.00E+00	9.05E-21	8.42E-21	6.49E-21	4.85E-21	3.47E-21	2.46E-21	1.65E-21	7.53E-22	3.67E-22	1.69E-22
6.00E+00	- 5.00E+00	7.51E-21	6.98E-21	5.35E-21	3.95E-21	2.79E-21	1.94E-21	1.27E-21	5.52E-22	2.56E-22	1.11E-22
5.00E+00	- 4.00E+00	5.58E-21	5.19E-21	3.93E-21	2.88E-21	2.01E-21	1.38E-21	8.83E-22	3.65E-22	1.61E-22	6.61E-23
4.00E+00	- 3.00E+00	3.72E-21	3.46E-21	2.58E-21	1.86E-21	1.28E-21	8.56E-22	5.34E-22	2.05E-22	8.39E-23	3.19E-23
3.00E+00	- 2.50E+00	2.40E-21	2.22E-21	1.64E-21	1.16E-21	7.83E-22	5.13E-22	3.05E-22	1.08E-22	4.07E-23	1.40E-23
2.50E+00	- 2.00E+00	1.56E-21	1.45E-21	1.05E-21	7.36E-22	4.86E-22	3.13E-22	1.79E-22	5.88E-23	2.04E-23	6.48E-24
2.00E+00	- 1.50E+00	8.76E-22	8.16E-22	5.78E-22	3.99E-22	2.57E-22	1.61E-22	8.80E-23	2.59E-23	8.01E-24	2.29E-24
1.50E+00	- 1.00E+00	3.90E-22	3.67E-22	2.51E-22	1.68E-22	1.05E-22	6.20E-23	3.23E-23	8.08E-24	2.12E-24	5.27E-25
1.00E+00	- 7.00E-01	1.21E-22	1.14E-22	7.51E-23	4.79E-23	2.90E-23	1.58E-23	7.54E-24	1.54E-24	3.23E-25	6.44E-26
7.00E-01	- 4.50E-01	3.76E-23	3.56E-23	2.25E-23	1.37E-23	7.93E-24	3.99E-24	1.73E-24	3.00E-25	5.20E-26	8.60E-27
4.50E-01	- 3.00E-01	7.71E-24	7.26E-24	4.41E-24	2.57E-24	1.36E-24	6.22E-25	2.53E-25	3.35E-26	4.50E-27	5.86E-28
3.00E-01	- 1.50E-01	1.09E-24	1.01E-24	6.36E-25	3.56E-25	1.81E-25	7.89E-26	3.72E-26	4.56E-27	4.56E-28	5.36E-29
1.50E-01	- 1.00E-01	4.75E-27	4.30E-27	2.53E-27	1.23E-27	5.37E-28	1.98E-28	5.74E-29	4.24E-30	3.02E-31	2.00E-32
1.00E-01	- 7.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
7.00E-02	- 4.50E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.50E-02	- 3.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.00E-02	- 2.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.00E-02	- 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

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SCIENCE APPLICATIONS INC HUNTSVILLE ALA
RADIATION ENVIRONMENTS FROM TACTICAL NUCLEAR WEAPONS.(U)
JUL 76 M L GRITZNER, T E ALBERT, E A STRAKER

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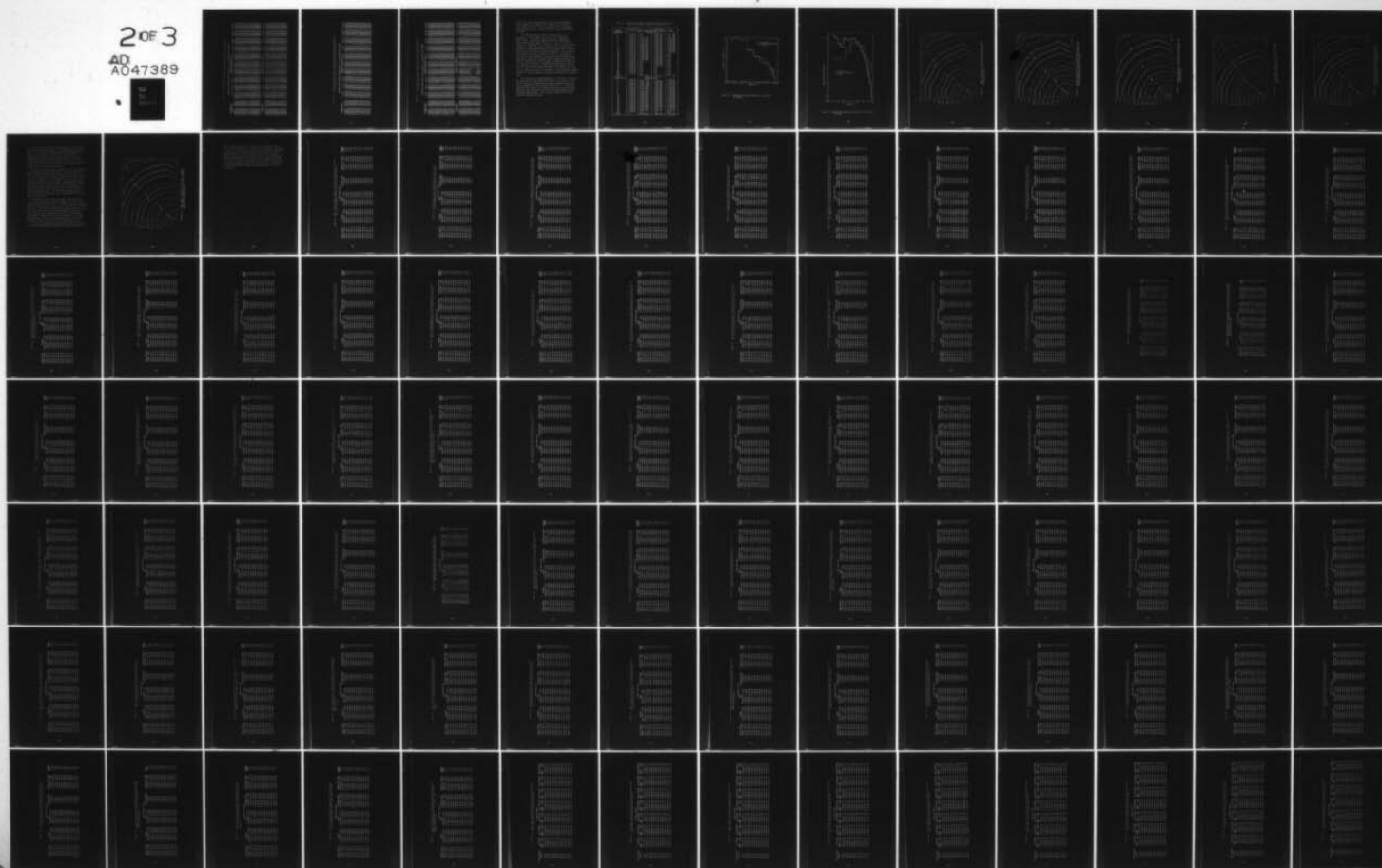


Table 39. Free-field gamma tissue dose source energy importance vs. ground range for a burst height of 800.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	4.70E-21	4.68E-21	4.22E-21	3.45E-21	2.77E-21	2.17E-21	1.66E-21	8.89E-22	4.50E-22	2.14E-22
1.22E+01 - 1.00E+01	4.82E-21	4.82E-21	4.34E-21	3.54E-21	2.84E-21	2.23E-21	1.70E-21	9.17E-22	4.66E-22	2.10E-22
1.00E+01 - 8.18E+00	4.49E-21	4.52E-21	4.06E-21	3.30E-21	2.66E-21	2.08E-21	1.59E-21	8.44E-22	4.24E-22	1.98E-22
8.18E+00 - 6.37E+00	2.85E-21	2.86E-21	2.37E-21	2.07E-21	1.66E-21	1.28E-21	9.67E-22	5.02E-22	2.43E-22	1.10E-22
6.37E+00 - 4.96E+00	1.43E-21	1.43E-21	1.30E-21	1.04E-21	8.29E-22	6.35E-22	4.76E-22	2.41E-22	1.13E-22	4.93E-23
4.96E+00 - 4.06E+00	9.45E-22	9.35E-22	8.48E-22	6.97E-22	5.57E-22	4.30E-22	3.22E-22	1.63E-22	7.63E-23	3.37E-23
4.06E+00 - 3.01E+00	1.03E-21	1.01E-21	9.20E-22	7.71E-22	6.20E-22	4.80E-22	3.57E-22	1.81E-22	8.45E-23	3.75E-23
3.01E+00 - 2.30E+00	1.35E-21	1.33E-21	1.20E-21	1.00E-21	8.08E-22	6.23E-22	4.62E-22	2.33E-22	1.08E-22	4.76E-23
2.30E+00 - 2.30E+00	1.47E-21	1.46E-21	1.30E-21	1.09E-21	8.81E-22	6.75E-22	4.98E-22	2.49E-22	1.15E-22	5.03E-23
2.30E+00 - 1.83E+00	1.40E-21	1.37E-21	1.23E-21	1.03E-21	8.23E-22	6.27E-22	4.58E-22	2.25E-22	1.02E-22	4.50E-23
1.83E+00 - 1.11E+00	1.32E-21	1.28E-21	1.15E-21	9.58E-22	7.56E-22	5.71E-22	4.12E-22	1.99E-22	9.01E-23	4.00E-23
1.11E+00 - 5.50E-01	1.18E-21	1.15E-21	1.02E-21	8.43E-22	6.60E-22	4.91E-22	3.51E-22	1.68E-22	7.71E-23	3.51E-23
5.50E-01 - 1.11E-01	8.54E-22	8.27E-22	7.28E-22	5.97E-22	4.66E-22	3.42E-22	2.45E-22	1.21E-22	5.89E-23	2.63E-23
1.11E-01 - 2.16E-02	5.02E-22	5.65E-22	5.00E-22	4.10E-22	3.24E-22	2.43E-22	1.81E-22	9.63E-23	4.90E-23	2.44E-23
2.16E-02 - 3.35E-03	4.89E-22	4.68E-22	4.19E-22	3.47E-22	2.72E-22	2.10E-22	1.60E-22	8.74E-23	4.59E-23	2.29E-23
3.35E-03 - 5.83E-04	4.32E-22	4.23E-22	3.83E-22	3.16E-22	2.46E-22	1.93E-22	1.49E-22	8.23E-23	4.41E-23	2.29E-23
5.83E-04 - 1.01E-04	4.05E-22	3.99E-22	3.66E-22	2.97E-22	2.31E-22	1.82E-22	1.42E-22	7.93E-23	4.31E-23	2.15E-23
1.01E-04 - 2.90E-05	3.83E-22	3.82E-22	3.58E-22	2.86E-22	2.19E-22	1.74E-22	1.38E-22	7.65E-23	4.24E-23	2.12E-23
2.90E-05 - 1.07E-05	3.67E-22	3.71E-22	3.58E-22	2.77E-22	2.10E-22	1.69E-22	1.37E-22	7.44E-23	4.23E-23	2.10E-23
1.07E-05 - 3.06E-06	3.53E-22	3.61E-22	3.59E-22	2.69E-22	2.03E-22	1.65E-22	1.35E-22	7.27E-23	4.24E-23	2.08E-23
3.06E-06 - 1.12E-06	3.36E-22	3.49E-22	3.64E-22	2.64E-22	1.96E-22	1.62E-22	1.35E-22	7.06E-23	4.24E-23	2.07E-23
1.12E-06 - 4.14E-07	3.19E-22	3.36E-22	3.69E-22	2.56E-22	1.89E-22	1.57E-22	1.34E-22	6.86E-23	4.25E-23	2.03E-23
4.14E-07 - 1.00E-07	3.00E-22	3.27E-22	3.77E-22	2.46E-22	1.85E-22	1.55E-22	1.36E-22	6.73E-23	4.27E-23	2.00E-23
GAMMA ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01 - 8.00E+00	7.93E-21	8.95E-21	7.19E-21	6.05E-21	5.26E-21	4.15E-21	3.22E-21	1.97E-21	1.12E-21	6.13E-22
8.00E+00 - 6.00E+00	5.62E-21	6.36E-21	5.06E-21	4.19E-21	3.62E-21	2.81E-21	2.15E-21	1.28E-21	6.90E-22	3.59E-22
6.00E+00 - 5.00E+00	4.45E-21	4.99E-21	3.97E-21	3.27E-21	2.73E-21	2.14E-21	1.61E-21	9.27E-22	4.78E-22	2.37E-22
5.00E+00 - 4.00E+00	3.36E-21	3.74E-21	2.99E-21	2.42E-21	2.03E-21	1.55E-21	1.15E-21	6.43E-22	3.17E-22	1.47E-22
4.00E+00 - 3.00E+00	2.27E-21	2.51E-21	2.03E-21	1.60E-21	1.32E-21	9.92E-22	7.26E-22	3.85E-22	1.79E-22	7.83E-23
3.00E+00 - 2.50E+00	1.53E-21	1.67E-21	1.34E-21	1.05E-21	8.43E-22	6.23E-22	4.48E-22	2.23E-22	9.63E-23	3.68E-23
2.50E+00 - 2.00E+00	1.09E-21	1.17E-21	9.54E-22	7.24E-22	5.75E-22	4.15E-22	2.94E-22	1.38E-22	5.61E-23	2.09E-23
2.00E+00 - 1.50E+00	6.93E-22	7.34E-22	6.10E-22	4.49E-22	3.44E-22	2.44E-22	1.67E-22	7.35E-23	2.72E-23	9.15E-24
1.50E+00 - 1.00E+00	3.72E-22	3.85E-22	3.20E-22	2.32E-22	1.70E-22	1.16E-22	7.76E-23	3.01E-23	9.95E-24	2.88E-24
1.00E+00 - 7.00E-01	1.70E-22	1.71E-22	1.43E-22	1.01E-22	7.00E-23	4.53E-23	2.87E-23	9.62E-24	2.61E-24	6.29E-25
7.00E-01 - 4.50E-01	3.80E-23	3.73E-23	6.52E-23	4.47E-23	2.93E-23	1.66E-23	1.09E-23	3.17E-24	7.43E-25	1.50E-25
4.50E-01 - 3.00E-01	3.30E-23	3.17E-23	2.61E-23	1.78E-23	1.13E-23	6.66E-24	3.69E-24	8.98E-25	1.76E-25	2.92E-26
3.00E-01 - 1.50E-01	1.32E-23	1.25E-23	1.01E-23	6.88E-24	4.25E-24	2.42E-24	1.26E-24	2.74E-25	4.83E-26	7.16E-27
1.50E-01 - 1.00E-01	2.09E-24	1.95E-24	1.49E-24	9.58E-25	5.49E-25	2.79E-25	1.29E-25	2.06E-26	2.38E-27	2.34E-28
1.00E-01 - 7.00E-02	6.18E-25	5.73E-25	4.31E-25	2.69E-25	1.48E-25	7.16E-26	3.17E-26	4.34E-27	4.23E-28	3.60E-29
7.00E-02 - 4.50E-02	1.47E-25	1.35E-25	1.01E-25	6.07E-26	3.21E-26	1.49E-26	6.24E-27	8.00E-28	6.94E-29	4.79E-30
4.50E-02 - 3.00E-02	4.13E-26	3.66E-26	2.53E-26	1.35E-26	5.67E-27	1.87E-27	5.74E-28	2.82E-29	6.72E-30	1.87E-31
3.00E-02 - 2.00E-02	3.13E-26	1.90E-26	6.18E-26	2.33E-26	6.24E-27	9.34E-28	9.67E-29	2.20E-30	1.79E-30	1.89E-31
2.00E-02 - 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 40. Armor shielded neutron tissue dose source energy importance vs. ground range for a burst height of 800.00 meters.

NEUTRON ENERGY GROUP (MEV)	IMPORTANCE (RADS/SOURCE NEUTRON/GROUP) AT 1.75 METERS ABOVE GROUND									
	50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01 - 1.22E+01	1.15E-20	1.14E-20	9.67E-21	7.60E-21	5.73E-21	4.08E-21	2.82E-21	1.23E-21	5.09E-22	2.03E-22
1.22E+01 - 1.00E+01	1.10E-20	1.10E-20	9.94E-21	7.83E-21	5.93E-21	4.22E-21	2.91E-21	1.26E-21	5.16E-22	2.03E-22
1.00E+01 - 8.18E+00	1.30E-20	1.31E-20	1.10E-20	8.70E-21	6.65E-21	4.75E-21	3.28E-21	1.46E-21	6.04E-22	2.43E-22
8.18E+00 - 6.37E+00	1.31E-20	1.32E-20	1.13E-20	8.88E-21	6.77E-21	4.91E-21	3.47E-21	1.59E-21	7.15E-22	3.09E-22
6.37E+00 - 4.96E+00	1.36E-20	1.36E-20	1.24E-20	9.38E-21	7.10E-21	5.26E-21	3.90E-21	1.62E-21	9.13E-22	4.20E-22
4.96E+00 - 4.06E+00	1.12E-20	1.11E-20	1.01E-20	7.56E-21	5.62E-21	4.09E-21	2.97E-21	1.30E-21	6.12E-22	2.59E-22
4.06E+00 - 3.01E+00	1.03E-20	1.02E-20	9.16E-21	6.80E-21	4.99E-21	3.58E-21	2.57E-21	1.08E-21	4.80E-22	1.90E-22
3.01E+00 - 2.30E+00	9.86E-21	9.85E-21	8.41E-21	6.34E-21	4.64E-21	3.25E-21	2.22E-21	9.01E-22	3.43E-22	1.21E-22
2.30E+00 - 2.00E+00	9.47E-21	9.61E-21	7.90E-21	6.03E-21	4.45E-21	3.07E-21	2.04E-21	8.10E-22	2.84E-22	9.25E-23
2.00E+00 - 1.83E+00	5.02E-21	5.04E-21	4.41E-21	3.17E-21	2.23E-21	1.54E-21	1.06E-21	4.11E-22	1.51E-22	4.83E-23
1.83E+00 - 1.11E+00	2.86E-21	2.88E-21	2.79E-21	1.84E-21	1.25E-21	8.80E-22	6.40E-22	2.43E-22	9.37E-23	2.89E-23
1.11E+00 - 5.50E-01	1.58E-21	1.61E-21	1.66E-21	1.01E-21	6.68E-22	4.69E-22	3.45E-22	1.24E-22	4.51E-23	1.21E-23
5.50E-01 - 1.11E-01	4.65E-22	4.88E-22	5.93E-22	2.92E-22	1.85E-22	1.27E-22	1.01E-22	2.93E-23	8.71E-24	4.12E-25
1.11E-01 - 2.18E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.18E-02 - 3.35E-03	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.35E-03 - 5.83E-04	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
5.83E-04 - 1.01E-04	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.01E-04 - 2.90E-05	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.90E-05 - 1.07E-05	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.07E-05 - 3.06E-06	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.06E-06 - 1.12E-06	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
1.12E-06 - 4.14E-07	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.14E-07 - 1.00E-07	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

Table 41. Armor shielded gamma tissue dose source energy importance vs. ground range for a burst height of 800.00 meters.

NEUTRON ENERGY GROUP (MEV)		IMPORTANCE (RADS/SOURCE PARTICLE/GROUP) AT 1.75 METERS ABOVE GROUND									
		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.50E+01	- 1.22E+01	3.58E-21	3.54E-21	3.31E-21	2.59E-21	2.11E-21	1.55E-21	1.15E-21	6.08E-22	2.66E-22	1.18E-22
1.22E+01	- 1.00E+01	3.72E-21	3.60E-21	3.48E-21	2.67E-21	2.18E-21	1.67E-21	1.21E-21	6.19E-22	2.84E-22	1.20E-22
1.00E+01	- 8.18E+00	3.87E-21	3.84E-21	3.76E-21	2.77E-21	2.26E-21	1.76E-21	1.28E-21	6.73E-22	3.06E-22	1.28E-22
8.18E+00	- 6.37E+00	6.24E-22	6.28E-22	5.66E-22	4.57E-22	3.66E-22	2.85E-22	2.15E-22	1.12E-22	5.52E-23	2.54E-23
6.37E+00	- 4.96E+00	3.07E-22	3.08E-22	2.79E-22	2.25E-22	1.80E-22	1.39E-22	1.04E-22	5.31E-23	2.52E-23	1.11E-23
4.96E+00	- 3.01E+00	3.90E-22	4.71E-22	3.16E-22	2.42E-22	1.87E-22	1.18E-22	7.63E-23	3.89E-23	8.18E-24	4.53E-24
4.06E+00	- 3.01E+00	9.52E-22	1.02E-21	8.72E-22	6.91E-22	5.46E-22	4.14E-22	3.16E-22	1.67E-22	9.02E-23	4.53E-23
3.01E+00	- 2.36E+00	2.66E-21	2.74E-21	2.80E-21	2.04E-21	1.59E-21	1.28E-21	1.07E-21	5.63E-22	3.39E-22	1.74E-22
2.36E+00	- 2.30E+00	2.38E-21	2.32E-21	2.38E-21	1.71E-21	1.30E-21	1.03E-21	8.45E-22	4.18E-22	2.40E-22	1.14E-22
2.30E+00	- 1.83E+00	2.18E-21	2.20E-21	2.23E-21	1.58E-21	1.19E-21	9.24E-22	7.44E-22	3.48E-22	1.89E-22	8.44E-23
1.83E+00	- 1.11E+00	2.11E-21	2.15E-21	1.96E-21	1.46E-21	1.09E-21	8.02E-22	5.94E-22	2.65E-22	1.22E-22	4.98E-23
1.11E+00	- 5.50E-01	2.03E-21	2.09E-21	1.76E-21	1.34E-21	1.00E-21	7.11E-22	4.94E-22	2.11E-22	8.29E-23	3.01E-23
5.50E-01	- 1.11E-01	1.20E-21	1.23E-21	1.14E-21	7.98E-22	5.63E-22	4.05E-22	2.97E-22	1.23E-22	5.23E-23	1.87E-23
1.11E-01	- 2.18E-02	7.06E-22	7.26E-22	7.71E-22	4.71E-22	3.19E-22	2.34E-22	1.84E-22	7.33E-23	3.26E-23	1.11E-23
2.18E-02	- 3.35E-03	4.09E-22	4.28E-22	4.75E-22	2.68E-22	1.76E-22	1.28E-22	1.00E-22	3.94E-23	1.65E-23	5.77E-24
3.35E-03	- 5.83E-04	1.65E-22	1.75E-22	2.21E-22	1.08E-22	7.06E-23	5.24E-23	4.52E-23	2.93E-23	1.09E-23	5.56E-24
5.83E-04	- 1.01E-04	9.84E-23	9.72E-23	8.94E-23	7.23E-23	5.67E-23	4.44E-23	3.49E-23	2.93E-23	1.07E-23	5.43E-24
1.01E-04	- 2.90E-05	9.29E-23	9.28E-23	8.70E-23	6.95E-23	5.35E-23	4.27E-23	3.38E-23	1.88E-23	1.05E-23	5.35E-24
2.90E-05	- 1.07E-05	8.90E-23	8.99E-23	8.70E-23	6.77E-23	5.15E-23	4.15E-23	3.34E-23	1.83E-23	1.05E-23	5.30E-24
1.07E-05	- 3.06E-06	8.54E-23	8.73E-23	8.60E-23	6.60E-23	4.98E-23	4.05E-23	3.32E-23	1.78E-23	1.04E-23	5.28E-24
3.06E-06	- 1.12E-06	8.12E-23	8.43E-23	8.78E-23	6.46E-23	4.79E-23	3.96E-23	3.31E-23	1.73E-23	1.04E-23	5.24E-24
1.12E-06	- 4.14E-07	7.72E-23	8.10E-23	8.90E-23	6.25E-23	4.63E-23	3.86E-23	3.31E-23	1.68E-23	1.03E-23	5.17E-24
4.14E-07	- 1.00E-07	7.46E-23	7.89E-23	9.06E-23	6.05E-23	4.55E-23	3.81E-23	3.34E-23	1.66E-23	1.03E-23	5.10E-24
GAMMA ENERGY GROUP (MEV)		GROUND RANGE (METERS)									
		50.00	100.00	200.00	300.00	400.00	500.00	600.00	800.00	1000.00	1200.00
1.00E+01	- 8.00E+00	2.07E-21	2.32E-21	1.89E-21	1.59E-21	1.38E-21	1.08E-21	8.48E-22	5.17E-22	2.96E-22	1.62E-22
8.00E+00	- 6.00E+00	1.44E-21	1.63E-21	1.31E-21	1.09E-21	9.33E-22	7.24E-22	5.56E-22	3.28E-22	1.79E-22	9.32E-23
6.00E+00	- 5.00E+00	1.10E-21	1.23E-21	9.87E-22	8.13E-22	6.92E-22	5.30E-22	4.00E-22	2.28E-22	1.19E-22	5.89E-23
5.00E+00	- 4.00E+00	7.54E-22	8.45E-22	6.78E-22	5.49E-22	4.62E-22	3.50E-22	2.61E-22	1.44E-22	7.19E-23	3.39E-23
4.00E+00	- 3.00E+00	4.47E-22	4.99E-22	4.04E-22	3.18E-22	2.64E-22	1.97E-22	1.44E-22	7.55E-23	3.57E-23	1.57E-23
3.00E+00	- 2.50E+00	2.53E-22	2.80E-22	2.24E-22	1.75E-22	1.42E-22	1.04E-22	7.43E-23	3.69E-23	1.60E-23	6.49E-24
2.50E+00	- 2.00E+00	1.46E-22	1.61E-22	1.30E-22	9.88E-23	7.87E-23	5.68E-23	3.98E-23	1.88E-23	7.64E-24	2.87E-24
2.00E+00	- 1.50E+00	6.99E-23	7.63E-23	6.29E-23	4.59E-23	3.54E-23	2.51E-23	1.72E-23	7.58E-24	2.82E-24	9.56E-25
1.50E+00	- 1.00E+00	2.45E-23	2.63E-23	2.24E-23	1.55E-23	1.14E-23	7.81E-24	5.29E-24	2.07E-24	6.95E-25	2.02E-25
1.00E+00	- 7.00E-01	5.57E-24	5.83E-24	4.97E-24	3.80E-24	2.30E-24	1.49E-24	9.53E-25	3.38E-25	9.07E-26	2.15E-26
7.00E-01	- 4.50E-01	1.27E-24	1.30E-24	1.13E-24	7.80E-25	4.76E-25	2.95E-25	1.78E-25	5.33E-26	1.26E-26	2.48E-27
4.50E-01	- 3.00E-01	1.74E-25	1.73E-25	1.47E-25	1.00E-25	5.67E-26	3.34E-26	1.88E-26	4.73E-27	8.79E-28	1.42E-28
3.00E-01	- 1.50E-01	2.20E-26	2.10E-26	1.71E-26	1.17E-26	6.96E-27	3.92E-27	2.10E-27	4.79E-28	8.21E-29	1.25E-29
1.50E-01	- 1.00E-01	3.61E-29	3.41E-29	2.66E-29	1.80E-29	8.79E-30	4.39E-30	2.30E-30	3.18E-31	3.48E-32	3.00E-33
1.00E-01	- 7.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
7.00E-02	- 4.50E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
4.50E-02	- 3.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
3.00E-02	- 2.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01
2.00E-02	- 1.00E-02	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01	0.00E-01

results for armor shielded doses, including the component due to gamma rays produced in the armor, can be obtained from Tables 16 and 17. Table 17 indicates that low energy, prompt gamma rays less than 100 keV are totally shielded by the armor.

In order to present values of prompt dose it is necessary to fold a source spectra with the importance distribution. A detailed example is given in Appendix A. Three source spectra, EM-1 fission⁽¹⁶⁾, low yield thermonuclear⁽¹⁷⁾ and Henre⁽¹⁸⁾ are given in Table 42 for an assumed intensity of each. The Henre source is not a weapon source spectra but is an approximation to the leakage at 90° from the thick target used during the Henre experiment. These normalized spectra are shown in Figures 11 and 12. The neutron spectra are given in Figure 11 in terms of neutrons/MeV/source neutron as a function of energy and the gamma ray spectra are shown in Figure 12 in terms of gamma rays/MeV/source gamma ray as a function of energy. Folding these three source spectra with the total source energy importance distributions for each detector results in total dose isodose (total prompt dose) contours as shown in Figures 13 through 18. These contours indicate the dose 1.75 meters above the ground as a function of height of burst.

The contours are shown normalized to rads/kiloton of blast and thus may be scaled with blast yield. The isodose contours for the fission and thermonuclear sources evidence slight ray effects compared to those for the Henre source. It should be noted that for each of the sources there are two burst heights which will give the same total dose for ground ranges greater than about 200.0 meters. This is due to the effect of the ground in reducing the dose.

Table 42. Neutron and gamma ray source spectra for folding with source energy importance distributions.

Group	Upper Energy (eV)	EM-1 Fission	Low Yield Thermonuclear	Henre
[Neutrons]		(Neutrons/kT)		
1	1.50 (+7)	0.0	3.15 (+21)	7.1 (+23)
2	1.22 (+7)	0.0	1.28 (+21)	8.0 (+22)
3	1.00 (+7)	7.34 (+20)	9.57 (+20)	4.0 (+22)
4	8.18 (+6)	1.27 (+21)	1.35 (+21)	2.98 (+22)
5	6.37 (+6)	1.67 (+21)	2.00 (+21)	3.02 (+22)
6	4.96 (+6)	1.34 (+21)	2.49 (+21)	3.00 (+22)
7	4.06 (+6)	4.89 (+21)	5.32 (+21)	3.00 (+22)
8	3.01 (+6)	3.83 (+21)	5.58 (+21)	2.22 (+22)
9	2.38 (+6)	9.32 (+20)	8.78 (+20)	2.55 (+21)
10	2.30 (+6)	7.70 (+21)	5.92 (+21)	1.83 (+22)
11	1.83 (+6)	1.68 (+22)	1.50 (+22)	7.00 (+21)
12	1.11 (+6)	1.17 (+22)	1.83 (+22)	0.0
13	5.50 (+5)	2.68 (+22)	2.33 (+22)	0.0
14	1.11 (+5)	1.04 (+22)	1.93 (+22)	0.0
15	2.18 (+4)	1.19 (+22)	2.22 (+22)	0.0
16	3.35 (+3)	0.0	5.48 (+22)	0.0
17	5.83 (+2)	0.0	1.66 (+22)	0.0
18	1.01 (+2)	0.0	1.56 (+21)	0.0
19	2.90 (+1)	0.0	0.0	0.0
20	1.07 (+1)	0.0	0.0	0.0
21	3.06 (+0)	0.0	0.0	0.0
22	1.12 (+0)	0.0	0.0	0.0
23	4.14 (-1)	0.0	0.0	0.0
Total		1.0 (+23)	2.0 (+23)	1.0 (+24)
[Gamma Ray]		(Gamma Rays/kT)		
1	1.00 (+7)	4.8 (+18)	0.0	1.00 (+21)
2	8.00 (+6)	5.00 (+19)	1.92 (+20)	3.62 (+21)
3	6.00 (+6)	6.73 (+19)	4.38 (+20)	2.78 (+21)
4	5.00 (+6)	2.24 (+20)	1.75 (+21)	5.00 (+21)
5	4.00 (+6)	6.35 (+20)	3.29 (+21)	6.00 (+21)
6	3.00 (+6)	6.70 (+20)	1.01 (+22)	6.00 (+21)
7	2.50 (+6)	1.13 (+21)	8.82 (+21)	7.00 (+21)
8	2.00 (+6)	2.03 (+21)	1.25 (+22)	1.26 (+22)
9	1.50 (+6)	4.23 (+21)	1.35 (+22)	1.64 (+22)
10	1.00 (+6)	4.96 (+21)	8.45 (+21)	1.61 (+22)
11	7.00 (+5)	6.02 (+21)	5.55 (+21)	1.30 (+22)
12	4.50 (+5)	4.14 (+21)	4.07 (+21)	6.90 (+21)
13	3.00 (+5)	3.08 (+21)	9.97 (+20)	3.12 (+21)
14	1.50 (+5)	1.43 (+21)	1.23 (+20)	1.75 (+20)
15	1.00 (+5)	2.09 (+20)	7.20 (+19)	1.03 (+20)
16	7.00 (+4)	3.04 (+20)	7.60 (+19)	1.09 (+20)
17	4.50 (+4)	4.09 (+20)	3.10 (+19)	4.43 (+19)
18	3.00 (+4)	4.09 (+20)	3.10 (+19)	4.43 (+19)
19	2.00 (+4)	0.0	0.0	0.0
Total		3.00 (+22)	7.00 (+22)	1.00 (+23)

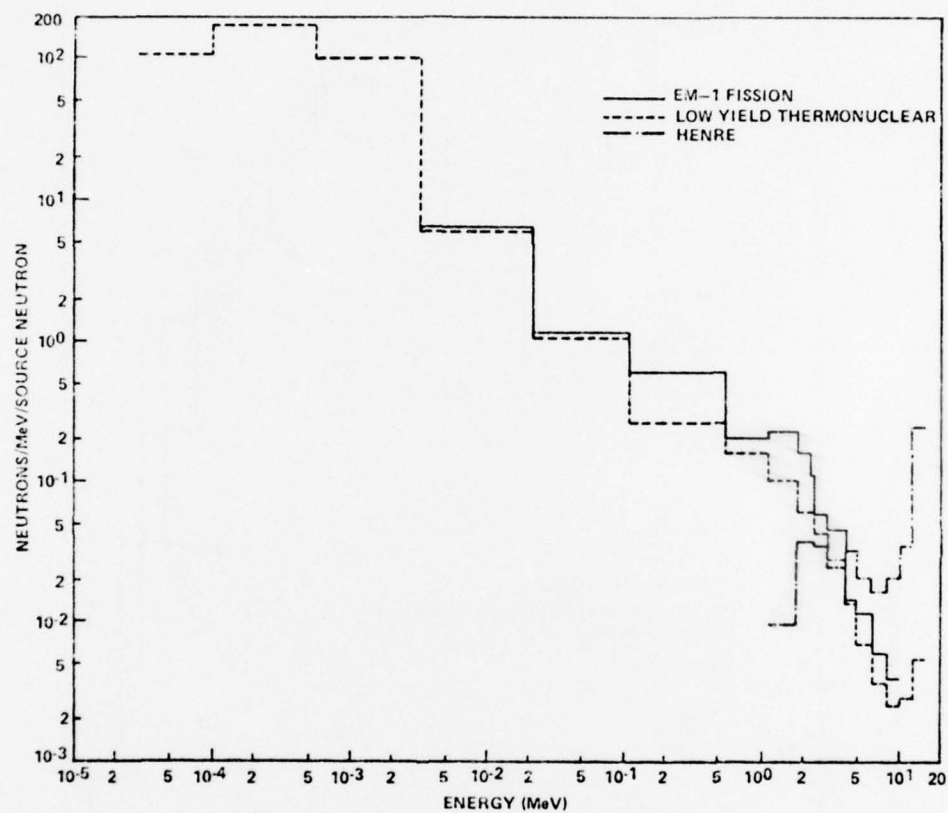


Figure 11. Normalized neutron spectra as a function of energy.

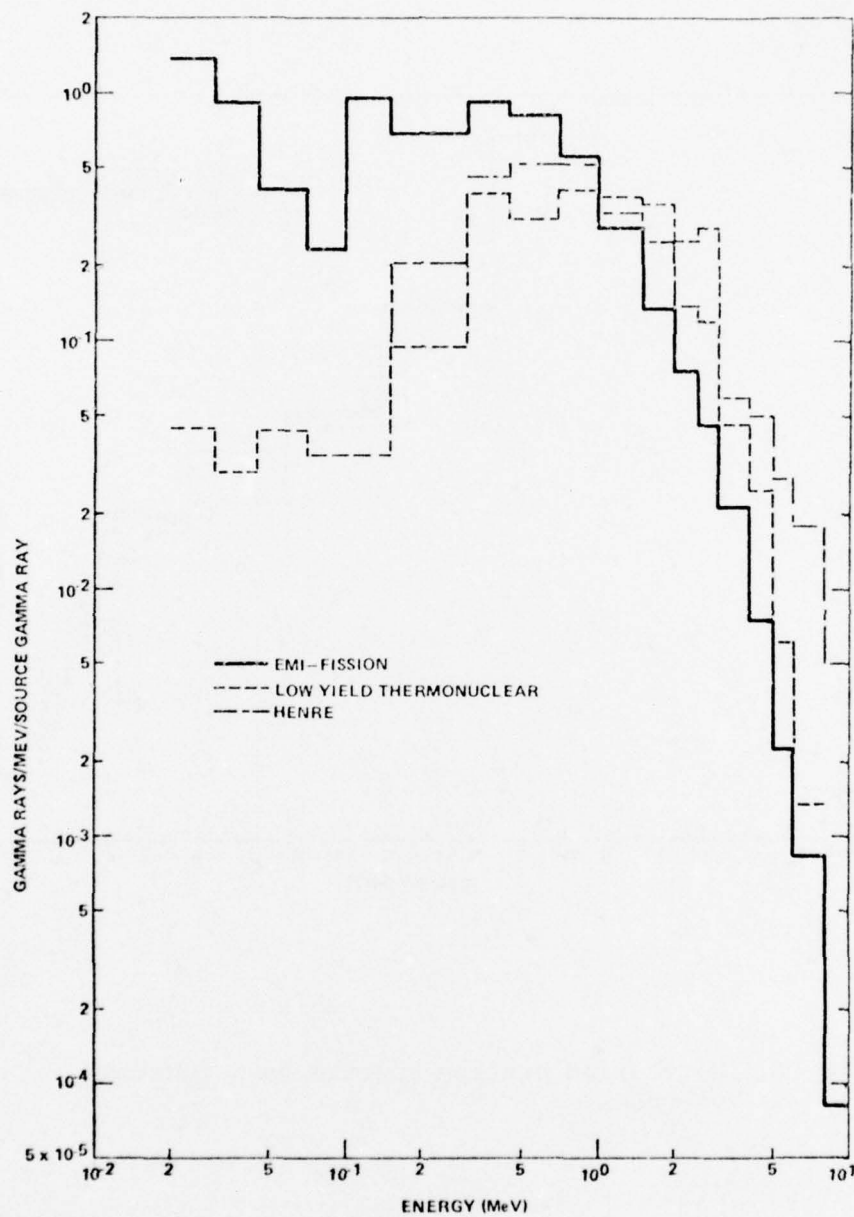


Figure 12. Normalized gamma ray spectra as a function of energy.

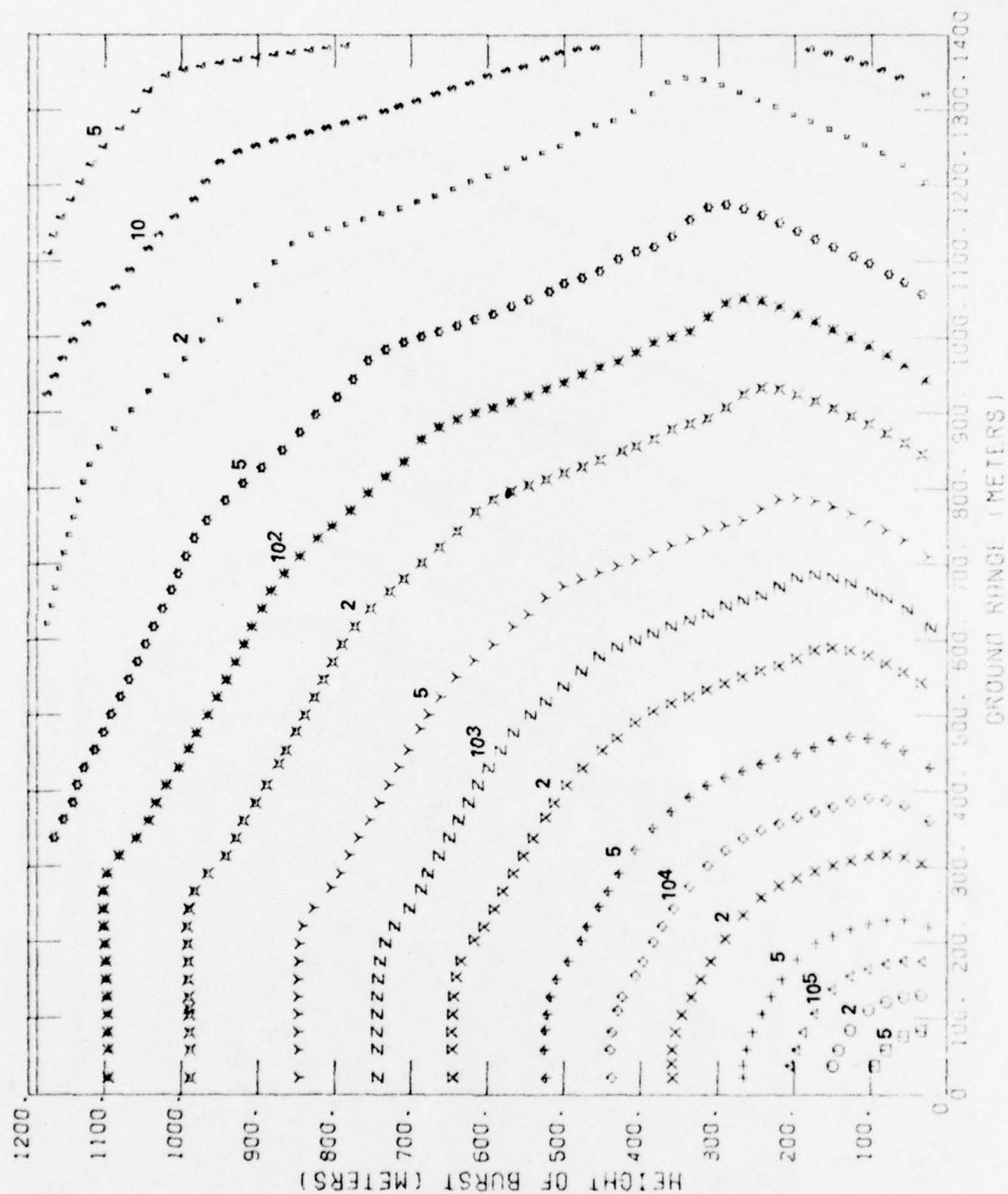


Figure 13. Prompt free-field tissue dose (rads/KT) 1.75 m above ground as a function of burst height for a fission source.

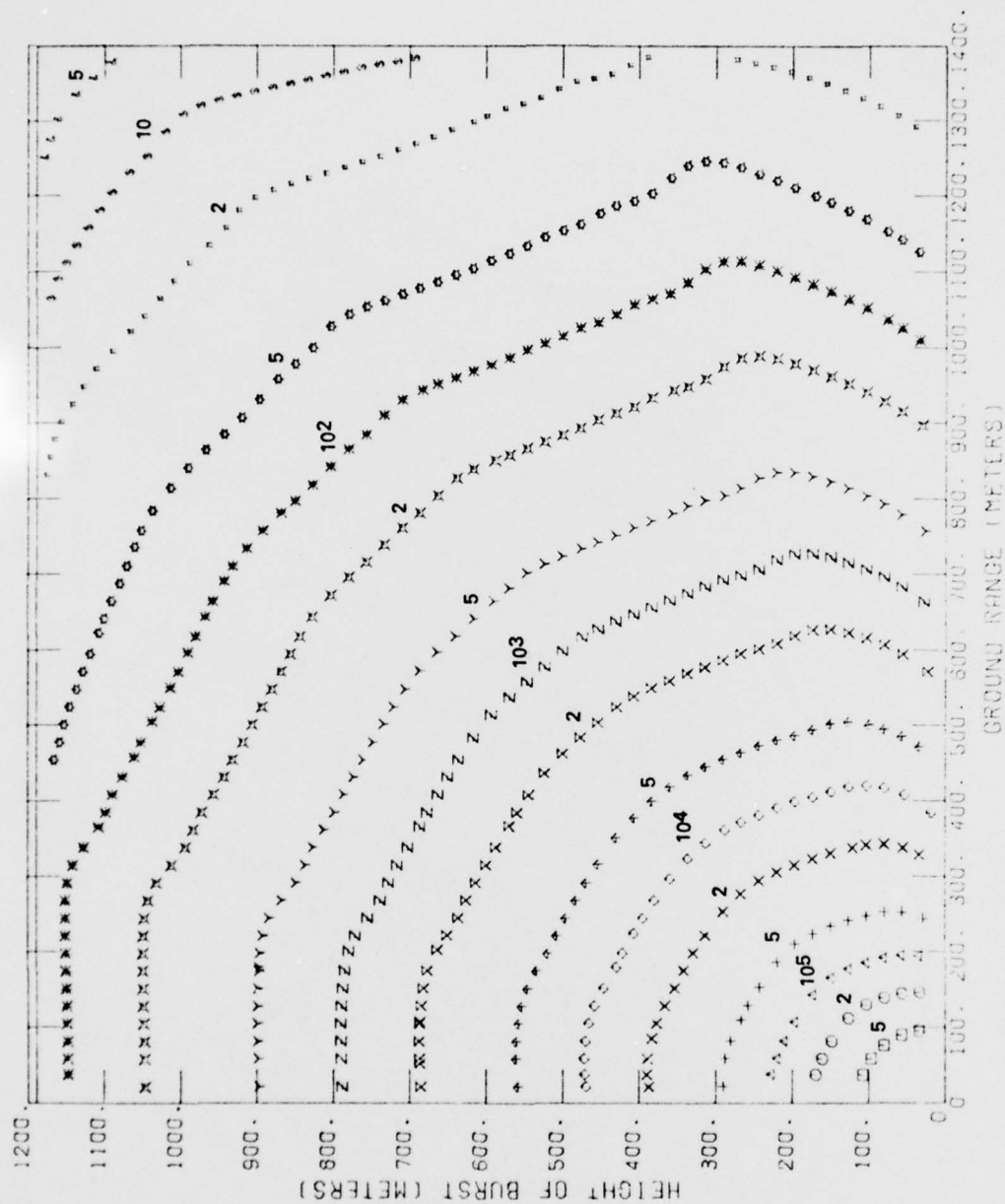


Figure 14. Prompt free-field tissue dose (rads/KT) 1.75 m above ground as a function of burst height for a low yield thermonuclear source.

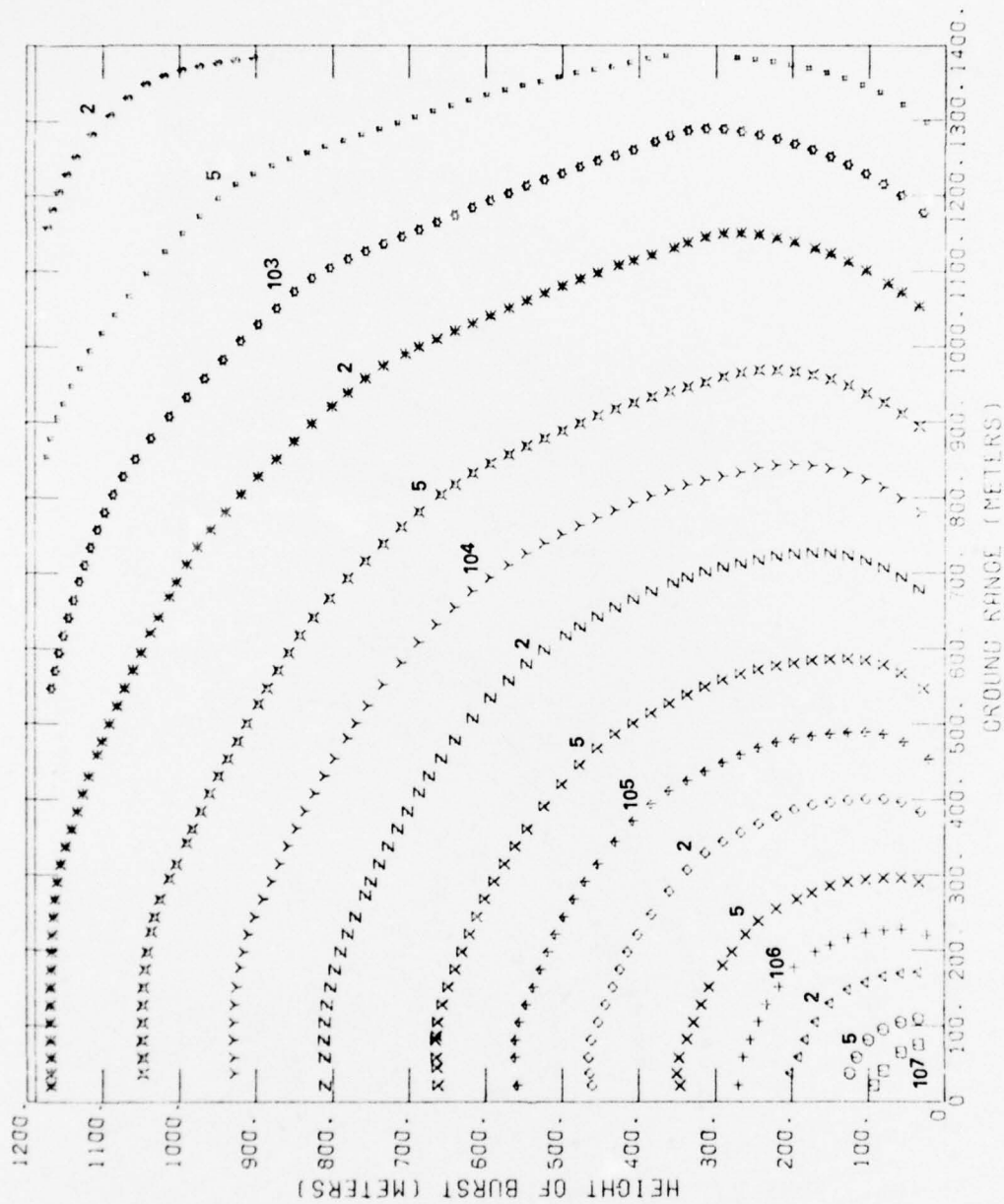


Figure 15. Prompt free-field tissue dose (rads/KT) 1.75 m above ground as a function of burst height for a Henre source.



Figure 16. Prompt armor shielded tissue dose (rads/KT) 1.75 m above ground as a function of burst height for a fission source.

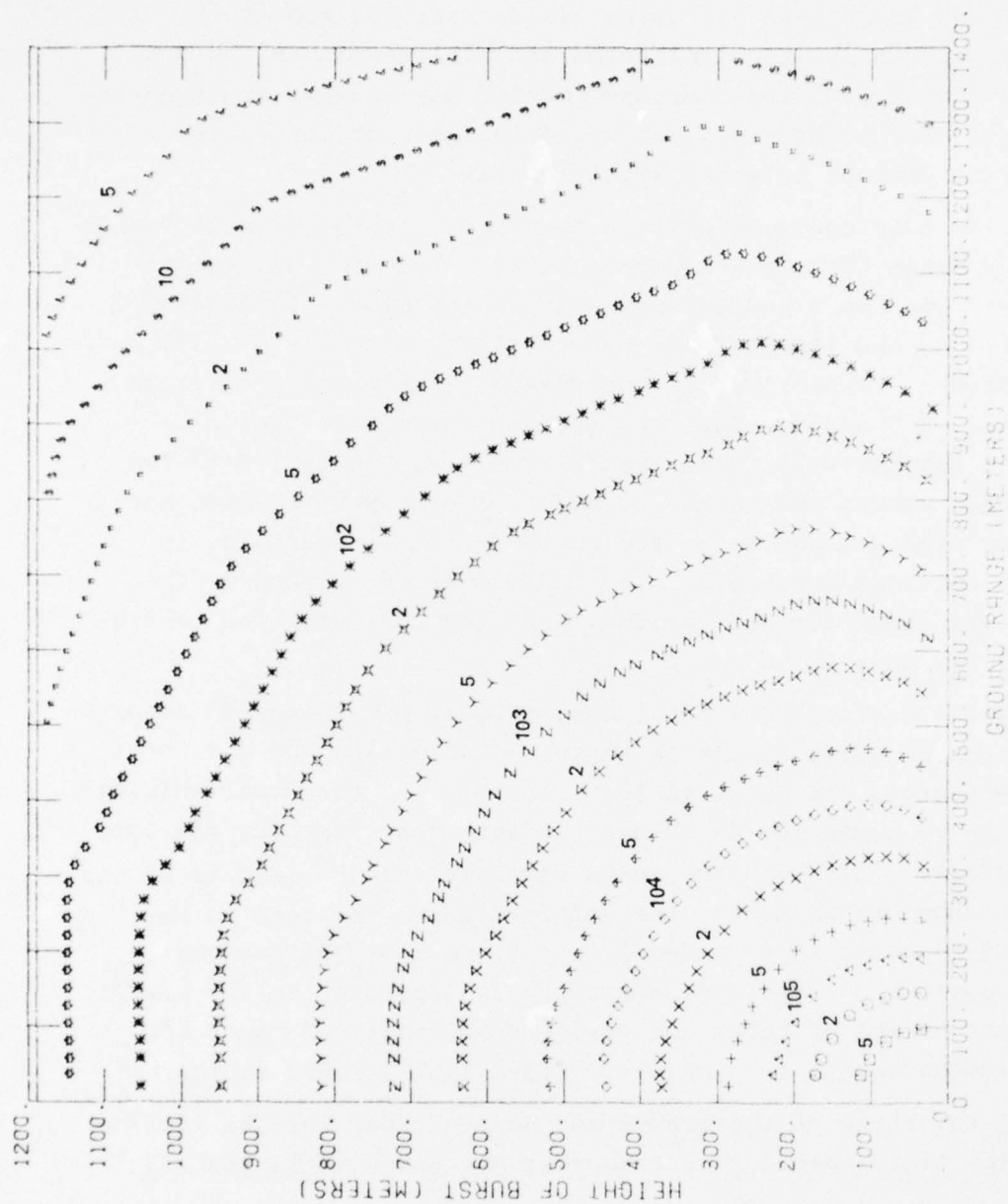


Figure 17. Prompt armor shielded tissue dose (rads/KT) 1.75 m above ground as a function of burst height for a low yield thermonuclear source.

The data in Figures 13-18 are similar to that generally given for overpressure results. By comparing the two types of curves it is possible to determine the relationship of overpressure and dose as a function of the height of burst. It should be noted that for large yields near the ground the delayed radiation is significant and will result in the dose being larger with the contours turning out as they approach the ground. For lower yields or higher heights of burst, the contours are not affected significantly.

An edit code was written to produce tables of dose versus ground range for a given weapon burst. The fission, thermonuclear and Henre sources were edited for blast yields of 5.0, 10.0, 30.0 and 100.0 KT for burst heights of 103, 129, 186 and 278 meters, respectively. The fission to blast yield ratios are 1.0, 0.5 and 0.1 for the fission, thermonuclear and Henre source respectively. The results are given in Tables 43-114. For each source and height of burst, the prompt, delayed and prompt plus delayed doses are given for the free-field and armor shielded detectors. The individual components of the dose are shown for each ground range together with the neutron/gamma ray dose ratio.

The variation of total dose (prompt plus delayed) as a function of burst height is shown in Tables 115-138 for these three sources and blast yields. In general, the armor shielded neutron to gamma ray dose ratio is less than that for the free field case. Although the gamma rays are attenuated more by the armor than the neutrons, the shielded gamma ray dose is enhanced by gamma rays produced in the armor by the neutrons. The neutron to gamma ray dose ratio is dependent on the yield and the height of burst and varies from about 0.2 for a 100 KT fission source to about 15.0 for a 100 KT Henre source.

The ratio of the prompt and delayed dose for the fission and low yield thermonuclear sources are given in Tables 139 -

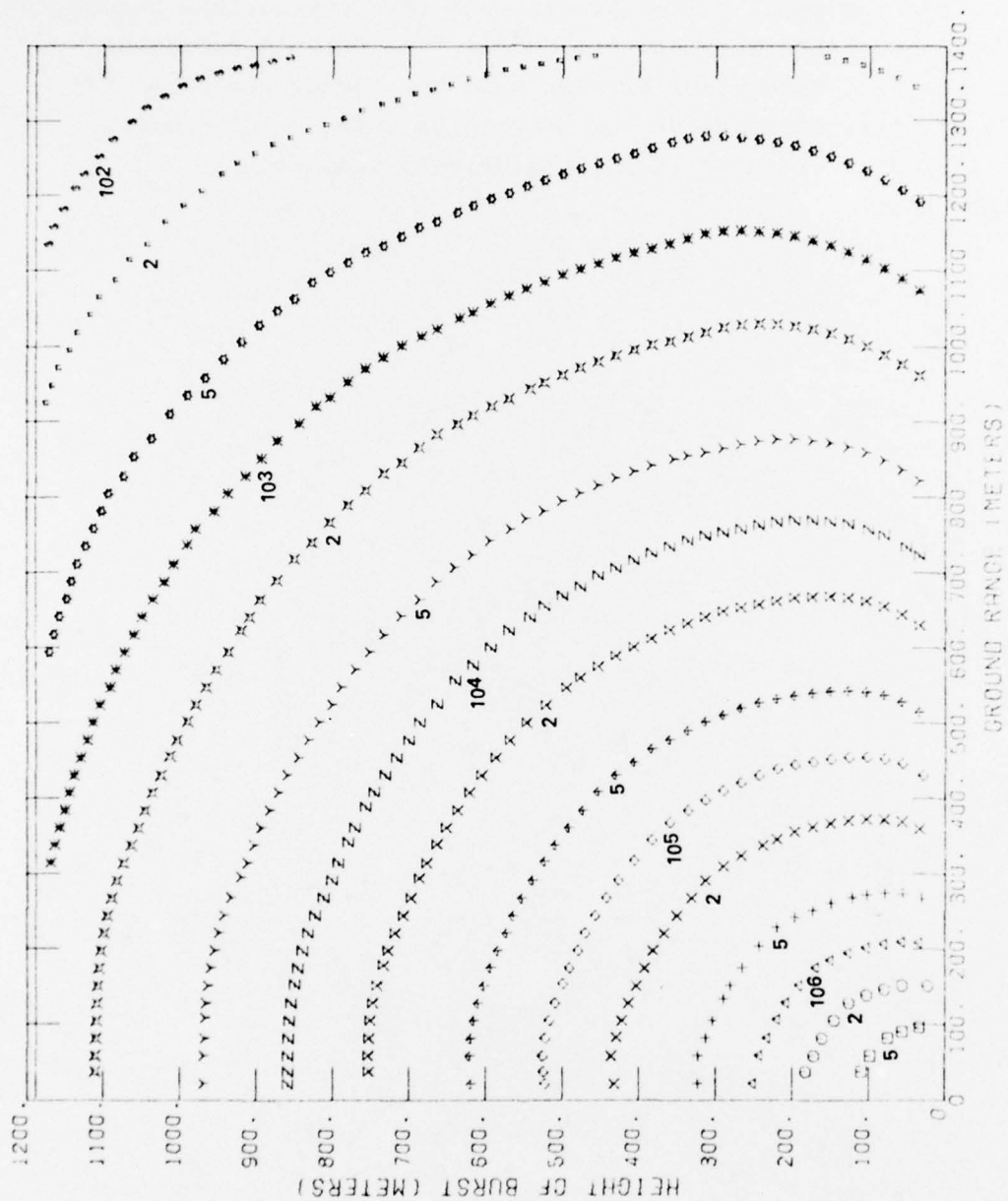


Figure 18. Prompt armor shielded tissue dose (rads/KT) 1.75 m above ground as a function of burst height for a Henre source.

146. Similar tables are not presented for the Henre source since the delayed dose is extremely small compared to the prompt. It is noted that the armor preferentially shields the delayed radiation and for a 100 KT fission source the delayed component becomes equal to the prompt dose for near surface bursts. On the other hand, the free-field dose from delayed radiation is a factor of about four greater than the prompt radiation for a 100 KT fission source at low heights of burst. For sources with less fission/total yield, the delayed radiation is not as important.

Table 43. EM-1 fission source prompt free-field tissue dose vs. range
for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		NEUTRON PLUS GAMMA		
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	
100.00	142.31	8.80E+04	1.08E+06	8.93E+03	2.03E+04	4.69E+04		9.69E+04	1.15E+06			16.08
200.00	224.17	1.70E+04	3.05E+05	2.18E+03	5.73E+03	1.87E+04		1.92E+04	3.30E+05			12.52
300.00	316.63	3.89E+03	1.05E+05	6.40E+02	1.89E+03	8.15E+03		4.53E+03	1.15E+05			10.49
400.00	412.62	1.05E+03	4.18E+04	2.24E+02	7.22E+02	3.77E+03		1.28E+03	4.63E+04			9.30
500.00	510.15	3.21E+02	1.73E+04	8.90E+01	3.05E+02	1.83E+03		4.10E+02	1.94E+04			8.09
600.00	608.40	1.07E+02	7.40E+03	3.88E+01	1.37E+02	9.29E+02		1.46E+02	8.46E+03			6.93
700.00	707.28	3.84E+01	3.30E+03	1.82E+01	6.46E+01	4.91E+02		5.66E+01	3.85E+03			5.94
800.00	806.38	1.45E+01	1.53E+03	9.00E+00	3.13E+01	2.68E+02		2.35E+01	1.83E+03			5.13
900.00	905.68	5.68E+00	7.41E+02	4.66E+00	1.56E+01	1.51E+02		1.03E+01	9.07E+02			4.46
1000.00	1005.11	2.31E+00	3.70E+02	2.50E+00	3.01E+00	8.70E+01		4.81E+00	4.65E+02			3.90
1100.00	1104.65	9.63E-01	1.91E+02	1.38E+00	4.21E+00	5.14E+01		2.35E+00	2.46E+02			3.42
1200.00	1204.26	4.11E-01	1.01E+02	7.86E-01	2.28E+00	3.10E+01		1.20E+00	1.34E+02			3.03

Table 44. Delayed free-field tissue dose vs. range for a
5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL				
100.00	142.31	5.81E+02	2.71E+03	2.31E+04	3.33E+04	7.23E+01	2.36E+04	3.61E+04	0.08			
200.00	224.17	1.27E+02	1.38E+03	8.02E+03	1.53E+04	7.59E+01	8.15E+03	1.68E+04	0.09			
300.00	316.63	2.13E+01	6.07E+02	2.74E+03	6.82E+03	5.95E+01	2.76E+03	7.48E+03	0.09			
400.00	412.62	4.43E+00	2.62E+02	1.07E+03	3.13E+03	3.68E+01	1.08E+03	3.43E+03	0.08			
500.00	510.15	1.10E+00	1.20E+02	4.76E+02	1.53E+03	2.16E+01	4.78E+02	1.67E+03	0.08			
600.00	608.48	2.81E-01	5.61E+01	2.25E+02	7.77E+02	1.25E+01	2.26E+02	8.46E+02	0.07			
700.00	707.28	6.96E-02	2.57E+01	1.10E+02	3.99E+02	7.01E+00	1.10E+02	4.32E+02	0.06			
800.00	806.38	2.08E-02	1.31E+01	5.87E+01	2.24E+02	4.25E+00	5.87E+01	2.41E+02	0.06			
900.00	905.68	5.93E-03	6.31E+00	3.17E+01	1.24E+02	2.53E+00	3.17E+01	1.33E+02	0.05			
1000.00	1005.11	1.93E-03	3.28E+00	1.83E+01	7.34E+01	1.60E+00	1.83E+01	7.83E+01	0.04			
1100.00	1104.65	5.54E-04	1.52E+00	1.02E+01	4.19E+01	9.93E-01	1.03E+01	4.44E+01	0.04			
1200.00	1204.26	1.77E-04	7.50E-01	6.05E+00	2.51E+01	6.43E-01	6.05E+00	2.65E+01	0.03			

Table 45. EM-1 fission source prompt plus delayed free-field tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON/ GAMMA RATIO	
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA			
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	NEUTRON PLUS GAMMA		
								UNCOLLIDED	TOTAL
100.00	142.31	8.86E+04	1.08E+06	3.20E+04	5.36E+04	4.70E+04		1.21E+05	1.18E+06
200.00	224.17	1.71E+04	3.07E+05	1.02E+04	2.11E+04	1.87E+04		2.73E+04	3.47E+05
300.00	316.63	3.91E+03	1.06E+05	3.38E+03	8.70E+03	8.21E+03		7.29E+03	1.23E+05
400.00	412.62	1.06E+03	4.20E+04	1.30E+03	3.85E+03	3.81E+03		2.35E+03	4.97E+04
500.00	510.15	3.22E+02	1.74E+04	5.65E+02	1.84E+03	1.85E+03		8.88E+02	2.11E+04
600.00	608.48	1.08E+02	7.45E+03	2.64E+02	9.15E+02	9.42E+02		3.72E+02	9.31E+03
700.00	707.28	3.85E+01	3.32E+03	1.28E+02	4.63E+02	4.98E+02		1.66E+02	4.29E+03
800.00	806.38	1.45E+01	1.55E+03	6.77E+01	2.55E+02	2.72E+02		8.22E+01	2.07E+03
900.00	905.68	5.69E+00	7.47E+02	3.63E+01	1.40E+02	1.53E+02		4.20E+01	1.04E+03
1000.00	1005.11	2.31E+00	3.73E+02	2.08E+01	8.14E+01	8.86E+01		2.31E+01	5.43E+02
1100.00	1104.65	9.63E-01	1.92E+02	1.16E+01	4.61E+01	5.24E+01		1.26E+01	2.91E+02
1200.00	1204.26	4.11E-01	1.02E+02	6.84E+00	2.74E+01	3.17E+01		7.25E+00	1.61E+02

Table 46. EM-1 fission source prompt armor shielded tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground

RANGE (METERS)		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLASMA		NEUTRON/GAMMA RATIO
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	
GROUND	SLANT									
100.00	142.31	6.68E+04	9.23E+05	1.68E+03	2.25E+03	1.17E+04	2.46E+05	6.85E+04	1.18E+06	3.55
200.00	224.17	1.27E+04	2.44E+05	4.41E+02	6.52E+02	4.67E+03	6.84E+04	1.31E+04	3.17E+05	3.31
300.00	316.63	2.86E+03	7.53E+04	1.39E+02	2.24E+02	2.03E+03	2.30E+04	3.00E+03	1.01E+05	2.99
400.00	412.62	7.66E+02	2.69E+04	5.15E+01	9.06E+01	9.35E+02	8.97E+03	8.17E+02	3.69E+04	2.69
500.00	510.15	2.32E+02	1.04E+04	2.15E+01	4.12E+01	4.53E+02	3.80E+03	2.53E+02	1.47E+04	2.42
600.00	608.48	7.70E+01	4.21E+03	9.72E+00	1.99E+01	2.29E+02	1.69E+03	8.67E+01	6.15E+03	2.18
700.00	707.28	2.74E+01	1.79E+03	4.70E+00	1.00E+01	1.21E+02	7.77E+02	3.21E+01	2.70E+03	1.97
800.00	806.38	1.03E+01	7.97E+02	2.38E+00	5.15E+00	6.60E+01	3.72E+02	1.27E+01	1.24E+03	1.80
900.00	905.68	4.03E+00	3.69E+02	1.26E+00	2.71E+00	3.72E+01	1.86E+02	5.29E+00	5.95E+02	1.64
1000.00	1005.11	1.63E+00	1.78E+02	6.88E-01	1.45E+00	2.16E+01	9.62E+01	2.32E+00	2.97E+02	1.49
1100.00	1104.65	6.81E-01	8.90E+01	3.86E-01	7.98E-01	1.28E+01	5.15E+01	1.07E+00	1.54E+02	1.37
1200.00	1204.26	2.90E-01	4.59E+01	2.22E-01	4.47E-01	7.76E+00	2.83E+01	5.12E-01	8.24E+01	1.26

Table 47. Delayed armor shielded tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		TOTAL		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	142.31	5.22E+02	2.24E+03	3.85E+03	4.35E+03	1.86E+01	5.74E+02	4.37E+03	7.19E+03	0.45		
200.00	224.17	1.14E+02	1.10E+03	1.45E+03	1.86E+03	1.93E+01	2.83E+02	1.57E+03	3.26E+03	0.51		
300.00	316.63	1.87E+01	4.17E+02	5.50E+02	7.98E+02	1.51E+01	1.09E+02	5.68E+02	1.34E+03	0.45		
400.00	412.62	3.88E+00	1.55E+02	2.31E+02	3.72E+02	9.29E+00	4.16E+01	2.35E+02	5.78E+02	0.37		
500.00	510.15	9.59E-01	6.34E+01	1.08E+02	1.89E+02	5.43E+00	1.71E+01	1.09E+02	2.75E+02	0.30		
600.00	608.48	2.45E-01	2.73E+01	5.33E+01	1.00E+02	3.13E+00	7.25E+00	5.36E+01	1.38E+02	0.25		
700.00	707.28	6.06E-02	1.19E+01	2.68E+01	5.38E+01	1.75E+00	2.98E+00	2.68E+01	7.04E+01	0.20		
800.00	806.38	1.81E-02	5.77E+00	1.47E+01	3.14E+01	1.06E+00	1.38E+00	1.48E+01	3.96E+01	0.17		
900.00	905.68	5.15E-03	2.76E+00	8.12E+00	1.82E+01	6.32E-01	6.45E-01	8.13E+00	2.22E+01	0.14		
1000.00	1005.11	1.67E-03	1.43E+00	4.76E+00	1.11E+01	3.98E-01	3.27E-01	4.77E+00	1.33E+01	0.12		
1100.00	1104.65	4.81E-04	6.98E-01	2.71E+00	6.58E+00	2.48E-01	1.50E-01	2.72E+00	7.68E+00	0.10		
1200.00	1204.26	1.54E-04	3.63E-01	1.62E+00	4.07E+00	1.61E-01	7.39E-02	1.62E+00	4.67E+00	0.08		

Table 48. EM-1 fission source prompt plus delayed armor shielded tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		NEUTRON				GAMMA				SECONDARY GAMMA				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL			
100.00	142.31	6.74E+04	9.26E+05	5.52E+03	6.60E+03	1.18E+04	2.47E+05	7.29E+04	1.19E+06					3.49		
200.00	224.17	1.28E+04	2.45E+05	1.90E+03	2.52E+03	4.68E+03	6.87E+04	1.47E+04	3.21E+05					3.23		
300.00	316.63	2.88E+03	7.58E+04	6.89E+02	1.02E+03	2.05E+03	2.31E+04	3.57E+03	1.02E+05					2.90		
400.00	412.62	7.70E+02	2.71E+04	2.83E+02	4.63E+02	9.45E+02	9.01E+03	1.05E+03	3.75E+04					2.60		
500.00	510.15	2.33E+02	1.05E+04	1.30E+02	2.30E+02	4.58E+02	3.82E+03	3.62E+02	1.50E+04					2.32		
600.00	608.48	7.73E+01	4.24E+03	6.30E+01	1.20E+02	2.32E+02	1.69E+03	1.40E+02	6.29E+03					2.07		
700.00	707.28	2.75E+01	1.81E+03	3.15E+01	6.38E+01	1.23E+02	7.80E+02	5.89E+01	2.77E+03					1.87		
800.00	806.38	1.03E+01	8.03E+02	1.71E+01	3.66E+01	6.71E+01	3.74E+02	2.74E+01	1.28E+03					1.68		
900.00	905.68	4.04E+00	3.72E+02	9.38E+00	2.09E+01	3.78E+01	1.86E+02	1.34E+01	6.17E+02					1.52		
1000.00	1005.11	1.64E+00	1.79E+02	5.45E+00	1.26E+01	2.20E+01	9.65E+01	7.09E+00	3.10E+02					1.37		
1100.00	1104.65	6.82E-01	8.97E+01	3.10E+00	7.38E+00	1.31E+01	5.16E+01	3.78E+00	1.62E+02					1.24		
1200.00	1204.26	2.91E-01	4.63E+01	1.85E+00	4.52E+00	7.93E+00	2.84E+01	2.14E+00	8.71E+01					1.13		

Table 49. Low yield thermonuclear source prompt free-field tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL		
100.00	142.31	1.16E+05	1.26E+06	4.47E+04	7.90E+04	1.18E+05	1.61E+05	1.46E+06	6.41			
200.00	224.17	2.31E+04	3.59E+05	1.19E+04	2.41E+04	4.11E+04	3.50E+04	4.24E+05	5.50			
300.00	316.63	5.40E+03	1.24E+05	3.79E+03	8.59E+03	1.57E+04	9.20E+03	1.48E+05	5.10			
400.00	412.62	1.49E+03	4.95E+04	1.41E+03	3.55E+03	6.71E+03	2.90E+03	5.97E+04	4.82			
500.00	510.15	4.58E+02	2.07E+04	5.87E+02	1.63E+03	3.15E+03	1.05E+03	2.54E+04	4.32			
600.00	608.48	1.54E+02	8.94E+03	2.64E+02	7.92E+02	1.59E+03	4.18E+02	1.13E+04	3.76			
700.00	707.28	5.52E+01	4.04E+03	1.26E+02	3.95E+02	8.49E+02	1.82E+02	5.28E+03	3.25			
800.00	806.38	2.07E+01	1.90E+03	6.33E+01	2.00E+02	4.72E+02	8.40E+01	2.58E+03	2.83			
900.00	905.68	8.11E+00	9.36E+02	3.29E+01	1.03E+02	2.71E+02	4.10E+01	1.31E+03	2.50			
1000.00	1005.11	3.27E+00	4.76E+02	1.77E+01	5.41E+01	1.60E+02	2.09E+01	6.90E+02	2.23			
1100.00	1104.65	1.36E+00	2.50E+02	9.72E+00	2.89E+01	9.60E+01	1.11E+01	3.75E+02	2.00			
1200.00	1204.26	5.73E-01	1.35E+02	5.47E+00	1.58E+01	5.88E+01	6.05E+00	2.09E+02	1.81			

Table 50. Delayed free-field tissue dose vs. range for a
5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND		UNCOLLIDED	TOTAL			
100.00	142.31	2.91E+02	1.36E+03	1.15E+04	1.67E+04	3.62E+01		1.18E+04	1.81E+04	0.03		
200.00	224.17	6.37E+01	6.88E+02	4.01E+03	7.67E+03	3.79E+01		4.08E+03	8.40E+03	0.09		
300.00	316.63	1.06E+01	3.03E+02	1.37E+03	3.41E+03	2.97E+01		1.38E+03	3.74E+03	0.09		
400.00	412.62	2.21E+00	1.31E+02	5.36E+02	1.57E+03	1.84E+01		5.38E+02	1.72E+03	0.08		
500.00	510.15	5.50E-01	5.98E+01	2.38E+02	7.66E+02	1.08E+01		2.39E+02	8.36E+02	0.08		
600.00	608.48	1.41E-01	2.80E+01	1.13E+02	3.89E+02	6.25E+00		1.13E+02	4.23E+02	0.07		
700.00	707.28	3.48E-02	1.29E+01	5.48E+01	1.99E+02	3.50E+00		5.48E+01	2.16E+02	0.06		
800.00	806.38	1.04E-02	6.56E+00	2.93E+01	1.12E+02	2.12E+00		2.93E+01	1.21E+02	0.06		
900.00	905.68	2.96E-03	3.15E+00	1.58E+01	6.21E+01	1.27E+00		1.58E+01	6.66E+01	0.05		
1000.00	1005.11	9.65E-04	1.64E+00	9.13E+00	3.67E+01	7.99E-01		9.13E+00	3.92E+01	0.04		
1100.00	1104.65	2.77E-04	7.58E-01	5.12E+00	2.10E+01	4.96E-01		5.13E+00	2.22E+01	0.04		
1200.00	1204.26	8.87E-05	3.75E-01	3.03E+00	1.26E+01	3.22E-01		3.03E+00	1.33E+01	0.03		

Table 51. Low yield thermonuclear source prompt plus delayed free-field tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)			TISSUE DOSE (RADS)								NEUTRON/ GAMMA RATIO
			NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		
GROUND	SLANT		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND		UNCOLLIDED	TOTAL	
100.00	142.31		1.17E+03	1.27E+06	5.62E+04	9.57E+04	1.18E+05		1.73E+05	1.48E+06	5.92
200.00	224.17		2.32E+04	3.59E+05	1.59E+04	3.18E+04	4.12E+04		3.91E+04	4.32E+05	4.93
300.00	316.63		5.42E+03	1.24E+05	5.16E+03	1.20E+04	1.58E+04		1.06E+04	1.52E+05	4.48
400.00	412.62		1.49E+03	4.96E+04	1.95E+03	5.12E+03	6.72E+03		3.44E+03	6.14E+04	4.19
500.00	510.15		4.59E+02	2.07E+04	8.25E+02	2.40E+03	3.16E+03		1.28E+03	2.63E+04	3.73
600.00	608.48		1.54E+02	8.97E+03	3.77E+02	1.18E+03	1.60E+03		5.31E+02	1.17E+04	3.23
700.00	707.28		5.52E+01	4.05E+03	1.81E+02	5.94E+02	8.52E+02		2.36E+02	5.50E+03	2.80
800.00	806.38		2.08E+01	1.91E+03	9.26E+01	3.12E+02	4.74E+02		1.13E+02	2.70E+03	2.43
900.00	903.68		8.11E+00	9.39E+02	4.87E+01	1.65E+02	2.72E+02		5.69E+01	1.38E+03	2.15
1000.00	1003.11		3.27E+00	4.78E+02	2.68E+01	9.08E+01	1.60E+02		3.01E+01	7.29E+02	1.90
1100.00	1104.65		1.36E+00	2.51E+02	1.48E+01	4.99E+01	9.65E+01		1.62E+01	3.97E+02	1.71
1200.00	1204.26		5.73E-01	1.35E+02	8.50E+00	2.83E+01	5.91E+01		9.07E+00	2.23E+02	1.55

Table 52. Low yield thermonuclear source prompt armor shielded tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON			GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA		
		GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	
100.00	142.31	8.66E+04	1.07E+06	1.06E+04	1.34E+04	3.01E+04	4.36E+05	9.71E+04	1.55E+06		2.23	
200.00	224.17	1.69E+04	2.85E+05	2.89E+03	4.06E+03	1.04E+04	1.12E+05	1.98E+04	4.12E+05		2.25	
300.00	316.63	3.90E+03	8.97E+04	9.45E+02	1.44E+03	3.94E+03	3.65E+04	4.85E+03	1.32E+05		2.14	
400.00	412.62	1.06E+03	3.25E+04	3.60E+02	6.01E+02	1.67E+03	1.37E+04	1.42E+03	4.85E+04		2.04	
500.00	510.15	3.25E+02	1.28E+04	1.53E+02	2.80E+02	7.78E+02	5.53E+03	4.78E+02	1.94E+04		1.94	
600.00	608.48	1.09E+02	5.26E+03	6.99E+01	1.39E+02	3.92E+02	2.21E+03	1.79E+02	8.00E+03		1.92	
700.00	707.28	3.88E+01	2.28E+03	3.39E+01	7.07E+01	2.10E+02	9.96E+02	7.27E+01	3.55E+03		1.78	
800.00	806.38	1.45E+01	1.03E+03	1.72E+01	3.67E+01	1.17E+02	4.68E+02	3.17E+01	1.65E+03		1.65	
900.00	905.68	5.68E+00	4.82E+02	9.04E+00	1.94E+01	6.73E+01	2.29E+02	1.47E+01	7.98E+02		1.52	
1000.00	1005.11	2.29E+00	2.35E+02	4.90E+00	1.04E+01	3.99E+01	1.17E+02	7.18E+00	4.02E+02		1.41	
1100.00	1104.65	9.47E-01	1.19E+02	2.72E+00	5.67E+00	2.41E+01	6.15E+01	3.67E+00	2.11E+02		1.31	
1200.00	1204.26	4.01E-01	6.23E+01	1.54E+00	3.15E+00	1.49E+01	3.36E+01	1.94E+00	1.14E+02		1.21	

Table 53. Delayed armor shielded tissue dose vs. range for a
5.0 KT weapon burst 103.00 meters above ground.

TISSUE DOSE (RADS)										
RANGE (METERS)		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	
100.00	142.31	2.61E+02	1.12E+03	1.92E+03	2.18E+03	9.28E+00	2.87E+02	2.18E+03	3.59E+03	0.45
200.00	224.17	5.69E+01	5.46E+02	7.27E+02	9.32E+02	9.65E+00	1.41E+02	7.84E+02	1.63E+03	0.51
300.00	316.63	9.37E+00	2.09E+02	2.75E+02	3.99E+02	7.53E+00	5.45E+01	2.84E+02	6.70E+02	0.45
400.00	412.62	1.94E+00	7.77E+01	1.16E+02	1.86E+02	4.65E+00	2.08E+01	1.18E+02	2.89E+02	0.37
500.00	510.15	4.80E-01	3.17E+01	5.41E+01	9.43E+01	2.72E+00	8.56E+00	5.45E+01	1.37E+02	0.30
600.00	608.43	1.22E-01	1.36E+01	2.67E+01	5.00E+01	1.56E+00	3.62E+00	2.68E+01	6.88E+01	0.25
700.00	707.28	3.03E-02	5.93E+00	1.34E+01	2.69E+01	8.75E-01	1.49E+00	1.34E+01	3.52E+01	0.20
800.00	806.38	9.03E-03	2.88E+00	7.37E+00	1.57E+01	5.29E-01	6.89E-01	7.38E+00	1.98E+01	0.17
900.00	905.68	2.57E-03	1.38E+00	4.06E+00	9.09E+00	3.16E-01	3.22E-01	4.06E+00	1.11E+01	0.14
1000.00	1005.11	8.37E-04	7.15E-01	2.38E+00	5.57E+00	1.99E-01	1.63E-01	2.38E+00	6.65E+00	0.12
1100.00	1104.65	2.40E-04	3.49E-01	1.36E+00	3.29E+00	1.24E-01	7.51E-02	1.36E+00	3.84E+00	0.10
1200.00	1204.26	7.69E-05	1.82E-01	8.12E-01	2.04E+00	8.07E-02	3.70E-02	8.12E-01	2.34E+00	0.08

Table 54. Low yield thermonuclear source prompt plus delayed armor shielded tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		NEUTRON PLUS GAMMA		
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	
100.00	142.31	8.68E+04	1.07E+06	1.25E+04	1.56E+04	3.01E+04	4.36E+05	9.93E+04	1.55E+06			2.22
200.00	224.17	1.70E+04	2.86E+05	3.62E+03	4.99E+03	1.04E+04	1.12E+05	2.06E+04	4.14E+05			2.24
300.00	316.63	3.91E+03	8.99E+04	1.22E+03	1.84E+03	3.95E+03	3.65E+04	5.13E+03	1.32E+05			2.12
400.00	412.62	1.06E+03	3.26E+04	4.76E+02	7.87E+02	1.67E+03	1.37E+04	1.54E+03	4.88E+04			2.02
500.00	510.15	3.26E+02	1.28E+04	2.07E+02	3.75E+02	7.81E+02	5.54E+03	5.32E+02	1.95E+04			1.91
600.00	608.48	1.09E+02	5.27E+03	9.65E+01	1.89E+02	3.94E+02	2.22E+03	2.05E+02	8.07E+03			1.88
700.00	707.28	3.88E+01	2.28E+03	4.73E+01	9.76E+01	2.11E+02	9.97E+02	8.61E+01	3.59E+03			1.75
800.00	806.38	1.46E+01	1.03E+03	2.46E+01	5.24E+01	1.17E+02	4.69E+02	3.91E+01	1.67E+03			1.61
900.00	905.68	5.68E+00	4.83E+02	1.31E+01	2.85E+01	6.76E+01	2.30E+02	1.88E+01	8.09E+02			1.48
1000.00	1005.11	2.29E+00	2.36E+02	7.28E+00	1.60E+01	4.01E+01	1.17E+02	9.57E+00	4.09E+02			1.36
1100.00	1104.65	9.47E-01	1.20E+02	4.08E+00	8.96E+00	2.42E+01	6.15E+01	5.02E+00	2.14E+02			1.26
1200.00	1204.26	4.01E-01	6.24E+01	2.36E+00	5.19E+00	1.49E+01	3.36E+01	2.76E+00	1.16E+02			1.16

Table 55. Henre source prompt free-field tissue dose vs. range
for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		NEUTRON				TISSUE DOSE (RADS)				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	GAMMA		UNCOLLIDED	TOTAL	SECONDARY GAMMA		UNCOLLIDED	TOTAL	
								AIR-GROUND				
100.00	142.31	3.87E+06	1.80E+07	7.11E+04	1.19E+05	1.68E+06				3.94E+06	1.98E+07	10.05
200.00	224.17	8.39E+05	5.76E+06	1.99E+04	3.68E+04	5.60E+05				8.59E+05	6.35E+06	9.65
300.00	316.63	2.09E+05	2.12E+06	6.76E+03	1.35E+04	2.46E+05				2.15E+05	2.38E+06	8.16
400.00	412.62	5.95E+04	8.81E+05	2.71E+03	5.76E+03	1.22E+05				6.22E+04	1.01E+06	6.88
500.00	510.15	1.86E+04	3.97E+05	1.22E+03	2.77E+03	6.44E+04				1.99E+04	4.65E+05	5.92
600.00	608.48	6.27E+03	1.88E+05	5.98E+02	1.42E+03	3.53E+04				6.86E+03	2.24E+05	5.12
700.00	707.28	2.22E+03	9.18E+04	3.12E+02	7.56E+02	1.99E+04				2.53E+03	1.12E+05	4.43
800.00	806.38	8.15E+02	4.65E+04	1.71E+02	4.12E+02	1.16E+04				9.86E+02	5.85E+04	3.87
900.00	905.68	3.09E+02	2.44E+04	9.70E+01	2.30E+02	6.87E+03				4.06E+02	3.15E+04	3.44
1000.00	1003.11	1.21E+02	1.33E+04	5.68E+01	1.30E+02	4.15E+03				1.77E+02	1.75E+04	3.10
1100.00	1104.65	4.81E+01	7.43E+03	3.41E+01	7.56E+01	2.54E+03				3.22E+01	1.00E+04	2.84
1200.00	1204.26	1.95E+01	4.23E+03	2.10E+01	4.47E+01	1.57E+03				4.05E+01	5.85E+03	2.62

Table 56. Delayed free-field tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		NEUTRON				TOTAL		CAND		SECONDARY GAMMA		NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
		GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	TOTAL	UNCOLLIDED	TOTAL	
100.00	142.31			5.81E+01	2.71E+02	2.31E+03	3.33E+03	7.23E+00				2.36E+03	3.61E+03	0.08
200.00	224.17			1.27E+01	1.38E+02	8.02E+02	1.53E+03	7.59E+00				8.15E+02	1.68E+03	0.09
300.00	316.63			2.13E+00	6.07E+01	2.74E+02	6.82E+02	5.95E+00				2.76E+02	7.48E+02	0.09
400.00	412.62			4.43E-01	2.62E+01	1.07E+02	3.13E+02	3.68E+00				1.06E+02	3.43E+02	0.08
500.00	510.15			1.10E-01	1.20E+01	4.76E+01	1.53E+02	2.16E+00				4.78E+01	1.67E+02	0.08
600.00	608.48			2.81E-02	5.61E+00	2.25E+01	7.77E+01	1.25E+00				2.26E+01	8.46E+01	0.07
700.00	707.28			6.96E-03	2.57E+00	1.10E+01	3.99E+01	7.01E-01				1.10E+01	4.32E+01	0.06
800.00	806.38			2.08E-03	1.31E+00	5.87E+00	2.24E+01	4.25E-01				5.87E+00	2.41E+01	0.06
900.00	905.68			5.93E-04	6.31E-01	3.17E+00	1.24E+01	2.53E-01				3.17E+00	1.33E+01	0.05
1000.00	1005.11			1.93E-04	3.28E-01	1.83E+00	7.34E+00	1.60E-01				1.83E+00	7.83E+00	0.04
1100.00	1104.65			5.54E-05	1.52E-01	1.02E+00	4.19E+00	9.93E-02				1.03E+00	4.44E+00	0.04
1200.00	1204.26			1.77E-05	7.50E-02	6.05E-01	2.51E+00	6.43E-02				6.05E-01	2.65E+00	0.03

Table 57. Henre source prompt plus delayed free-field tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON/ GAMMA RATIO	
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA			
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED		TOTAL
100.00	142.31	3.87E+06	1.80E+07	7.34E+04	1.22E+05	1.68E+06	3.94E+06	1.98E+07	10.03
200.00	224.17	8.39E+05	5.76E+06	2.07E+04	3.83E+04	5.60E+05	8.59E+05	6.35E+06	9.62
300.00	316.63	2.09E+05	2.12E+06	7.03E+03	1.42E+04	2.46E+05	2.16E+05	2.38E+06	8.14
400.00	412.62	5.95E+04	8.81E+05	2.82E+03	6.08E+03	1.22E+05	6.23E+04	1.01E+06	6.86
500.00	510.15	1.86E+04	3.97E+05	1.27E+03	2.92E+03	6.44E+04	1.99E+04	4.65E+05	5.91
600.00	608.48	6.27E+03	1.88E+05	6.21E+02	1.50E+03	3.53E+04	6.89E+03	2.24E+05	5.10
700.00	707.28	2.22E+03	9.18E+04	3.23E+02	7.96E+02	2.00E+04	2.54E+03	1.13E+05	4.42
800.00	806.38	8.15E+02	4.65E+04	1.77E+02	4.35E+02	1.16E+04	9.92E+02	5.85E+04	3.87
900.00	905.68	3.09E+02	2.44E+04	1.00E+02	2.42E+02	6.87E+03	4.10E+02	3.15E+04	3.43
1000.00	1005.11	1.21E+02	1.33E+04	5.86E+01	1.38E+02	4.15E+03	1.79E+02	1.76E+04	3.09
1100.00	1104.65	4.81E+01	7.43E+03	3.52E+01	7.98E+01	2.54E+03	8.32E+01	1.01E+04	2.83
1200.00	1204.26	1.95E+01	4.23E+03	2.16E+01	4.72E+01	1.57E+03	4.11E+01	5.85E+03	2.62

Table 58. Henre source prompt armor shielded tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		NEUTRON				GAMMA				TISSUE DOSE (RADS)				NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		TOTAL	TOTAL	TOTAL		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL					
100.00	142.31	2.61E+06	1.40E+07	1.78E+04	2.17E+04	4.18E+05	1.39E+06	2.63E+06	1.58E+07				7.66	
200.00	224.17	5.66E+05	4.58E+06	5.18E+03	6.86E+03	1.38E+05	3.79E+05	5.71E+05	5.10E+06				8.74	
300.00	316.63	1.41E+05	1.68E+06	1.82E+03	2.58E+03	6.02E+04	1.74E+05	1.43E+05	1.92E+06				7.12	
400.00	412.62	4.01E+04	6.82E+05	7.49E+02	1.14E+03	2.98E+04	8.02E+04	4.09E+04	7.93E+05				6.13	
500.00	510.15	1.26E+04	2.95E+05	3.44E+02	5.65E+02	1.57E+04	3.72E+04	1.29E+04	3.49E+05				5.52	
600.00	608.48	4.23E+03	1.33E+05	1.71E+02	3.00E+02	8.61E+03	1.84E+04	4.40E+03	1.60E+05				4.86	
700.00	707.28	1.49E+03	6.15E+04	9.05E+01	1.65E+02	4.88E+03	9.68E+03	1.59E+03	7.62E+04				4.18	
800.00	806.38	5.50E+02	2.93E+04	5.00E+01	9.26E+01	2.84E+03	5.21E+03	6.00E+02	3.75E+04				3.60	
900.00	905.68	2.09E+02	1.45E+04	2.86E+01	5.30E+01	1.69E+03	2.87E+03	2.37E+02	1.91E+04				3.13	
1000.00	1005.11	8.14E+01	7.37E+03	1.69E+01	3.08E+01	1.03E+03	1.61E+03	9.82E+01	1.00E+04				2.76	
1100.00	1104.65	3.24E+01	3.89E+03	1.02E+01	1.82E+01	6.33E+02	9.12E+02	4.26E+01	5.45E+03				2.49	
1200.00	1204.26	1.32E+01	2.10E+03	6.27E+00	1.10E+01	3.93E+02	5.20E+02	1.94E+01	3.02E+03				2.27	

Table 59. Delayed armor shielded tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

TISSUE DOSE (RADS)										
RANGE (METERS)		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	
100.00	142.31	5.22E+01	2.24E+02	3.85E+02	4.35E+02	1.86E+00	5.74E+01	4.37E+02	7.19E+02	0.45
200.00	224.17	1.14E+01	1.10E+02	1.45E+02	1.86E+02	1.93E+00	2.83E+01	1.57E+02	3.26E+02	0.51
300.00	316.63	1.87E+00	4.17E+01	5.50E+01	7.98E+01	1.51E+00	1.09E+01	5.68E+01	1.34E+02	0.45
400.00	412.62	3.80E-01	1.55E+01	2.31E+01	3.72E+01	9.29E-01	4.16E+00	2.35E+01	5.78E+01	0.37
500.00	510.15	9.59E-02	6.34E+00	1.08E+01	1.89E+01	5.43E-01	1.71E+00	1.09E+01	2.75E+01	0.30
600.00	608.48	2.45E-02	2.73E+00	5.33E+00	1.00E+01	3.13E-01	7.25E-01	5.36E+00	1.38E+01	0.25
700.00	707.28	6.06E-03	1.19E+00	2.68E+00	5.38E+00	1.75E-01	2.98E-01	2.68E+00	7.04E+00	0.20
800.00	806.38	1.81E-03	5.77E-01	1.47E+00	3.14E+00	1.06E-01	1.38E-01	1.48E+00	3.96E+00	0.17
900.00	905.68	5.15E-04	2.76E-01	8.12E-01	1.82E+00	6.32E-02	6.45E-02	8.13E-01	2.22E+00	0.14
1000.00	1005.11	1.67E-04	1.43E-01	4.76E-01	1.11E+00	3.98E-02	3.27E-02	4.77E-01	1.33E+00	0.12
1100.00	1104.65	4.81E-05	6.98E-02	2.71E-01	6.58E-01	2.48E-02	1.50E-02	2.72E-01	7.68E-01	0.10
1200.00	1204.26	1.54E-05	3.63E-02	1.62E-01	4.07E-01	1.61E-02	7.39E-03	1.62E-01	4.67E-01	0.08

Table 60. Henre source prompt plus delayed armor shielded tissue dose vs. range for a 5.0 KT weapon burst 103.00 meters above ground.

RANGE (METERS)		NEUTRON			GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
		UNCOLLIDED	TOTAL		UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL		
GROUND	SLANT											
100.00	142.31	2.61E+06	1.40E+07		1.82E+04	2.22E+04	4.18E+05	1.39E+06	2.63E+06	1.58E+07	7.66	
200.00	224.17	5.66E+05	4.58E+06		5.33E+03	7.05E+03	1.38E+05	3.79E+05	5.71E+05	5.10E+06	8.74	
300.00	316.63	1.41E+05	1.68E+06		1.87E+03	2.66E+03	6.02E+04	1.74E+05	1.43E+05	1.92E+06	7.12	
400.00	412.62	4.01E+04	6.82E+05		7.72E+02	1.17E+03	2.98E+04	8.02E+04	4.09E+04	7.93E+05	6.13	
500.00	510.15	1.26E+04	2.95E+05		3.55E+02	5.84E+02	1.57E+04	3.72E+04	1.29E+04	3.49E+05	5.52	
600.00	608.48	4.23E+03	1.33E+05		1.77E+02	3.10E+02	8.61E+03	1.84E+04	4.41E+03	1.60E+05	4.85	
700.00	707.28	1.50E+03	6.15E+04		9.32E+01	1.70E+02	4.88E+03	9.68E+03	1.59E+03	7.62E+04	4.18	
800.00	806.38	5.50E+02	2.93E+04		5.15E+01	9.58E+01	2.84E+03	5.21E+03	6.01E+02	3.75E+04	3.60	
900.00	905.68	2.09E+02	1.45E+04		2.94E+01	5.48E+01	1.69E+03	2.87E+03	2.38E+02	1.91E+04	3.13	
1000.00	1005.11	8.14E+01	7.37E+03		1.73E+01	3.19E+01	1.03E+03	1.61E+03	9.87E+01	1.00E+04	2.76	
1100.00	1104.65	3.24E+01	3.89E+03		1.04E+01	1.89E+01	6.33E+02	9.12E+02	4.29E+01	5.45E+03	2.49	
1200.00	1204.26	1.32E+01	2.10E+03		6.43E+00	1.14E+01	3.93E+02	5.20E+02	1.96E+01	3.02E+03	2.27	

Table 61. EM-1 fission source prompt free-field tissue dose vs. range
for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO	
GROUND	SLANT	NEUTRON		GAMMA		UNCOLLIDED	TOTAL		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	TOTAL		
100.00	161.84	1.14E+05	1.62E+06	1.22E+04	2.97E+04	7.75E+04	1.26E+05	1.73E+06	15.14
200.00	237.05	2.72E+04	5.55E+05	3.60E+03	1.01E+04	3.49E+04	3.08E+04	6.00E+05	12.33
300.00	325.87	6.80E+03	1.96E+05	1.15E+03	3.54E+03	1.59E+04	7.95E+03	2.16E+05	10.12
400.00	419.75	1.92E+03	8.11E+04	4.17E+02	1.37E+03	7.52E+03	2.34E+03	8.99E+04	9.12
500.00	515.94	6.01E+02	3.58E+04	1.69E+02	5.86E+02	9.71E+03	7.70E+02	4.01E+04	8.33
600.00	613.35	2.04E+02	1.59E+04	7.47E+01	2.70E+02	1.90E+03	2.78E+02	1.81E+04	7.34
700.00	711.47	7.36E+01	7.22E+03	3.53E+01	1.31E+02	1.01E+03	1.09E+02	8.36E+03	6.32
800.00	810.66	2.79E+01	3.36E+03	1.75E+01	6.56E+01	5.54E+02	4.55E+01	3.98E+03	5.43
900.00	908.95	1.10E+01	1.62E+03	9.12E+00	3.37E+01	3.13E+02	2.01E+01	1.97E+03	4.69
1000.00	1068.06	4.49E+00	8.10E+02	4.91E+00	1.77E+01	1.81E+02	9.40E+00	1.01E+03	4.07
1100.00	1107.34	1.83E+00	4.15E+02	2.72E+00	9.43E+00	1.07E+02	4.61E+00	5.32E+02	3.56
1200.00	1206.73	8.05E-01	2.19E+02	1.55E+00	5.12E+00	6.49E+01	2.36E+00	2.89E+02	3.13

Table 62. Delayed free-field tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL		
100.00	161.84	9.61E+02	4.02E+03	3.49E+04	4.73E+04	9.93E+01	3.59E+04	5.14E+04	0.08			
200.00	237.05	2.23E+02	2.15E+03	1.25E+04	2.29E+04	1.13E+02	1.27E+04	2.51E+04	0.09			
300.00	325.87	3.71E+01	9.66E+02	4.36E+03	1.04E+04	9.20E+01	4.39E+03	1.15E+04	0.09			
400.00	419.75	7.89E+00	4.18E+02	1.71E+03	4.80E+03	5.84E+01	1.72E+03	5.27E+03	0.09			
500.00	515.94	2.06E+00	1.96E+02	7.79E+02	2.41E+03	3.54E+01	7.81E+02	2.64E+03	0.08			
600.00	613.35	5.15E-01	9.29E+01	3.70E+02	1.24E+03	2.10E+01	3.71E+02	1.36E+03	0.07			
700.00	711.47	1.30E-01	4.39E+01	1.84E+02	6.55E+02	1.21E+01	1.84E+02	7.11E+02	0.07			
800.00	810.96	3.97E-02	2.29E+01	1.00E+02	3.76E+02	7.51E+00	1.00E+02	4.06E+02	0.06			
900.00	908.95	1.18E-02	1.14E+01	5.52E+01	2.14E+02	4.60E+00	5.52E+01	2.30E+02	0.05			
1000.00	1008.06	3.96E-03	6.08E+00	3.24E+01	1.30E+02	2.97E+00	3.24E+01	1.39E+02	0.05			
1100.00	1107.34	1.15E-03	2.84E+00	1.84E+01	7.49E+01	1.87E+00	1.84E+01	7.96E+01	0.04			
1200.00	1205.73	3.71E-04	1.41E+00	1.10E+01	4.54E+01	1.22E+00	1.10E+01	4.80E+01	0.03			

Table 63. EM-1 fission source prompt plus delayed free-field tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON			GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA		
		GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	UNCOLLIDED	
100.00	161.84	1.14E+05	1.63E+06	1.14E+05	1.63E+06	4.71E+04	7.69E+04	7.76E+04	1.62E+05	1.78E+06	10.53	
200.00	237.05	2.74E+04	5.57E+05	2.74E+04	5.57E+05	1.61E+04	3.29E+04	3.50E+04	4.35E+04	6.25E+05	8.20	
300.00	325.87	6.84E+03	1.97E+05	6.84E+03	1.97E+05	5.51E+03	1.39E+04	1.60E+04	1.23E+04	2.27E+05	6.60	
400.00	419.75	1.93E+03	8.15E+04	1.93E+03	8.15E+04	2.13E+03	6.17E+03	7.58E+03	4.06E+03	9.52E+04	5.93	
500.00	515.94	6.03E+02	3.60E+04	6.03E+02	3.60E+04	9.48E+02	3.00E+03	3.74E+03	1.55E+03	4.27E+04	5.34	
600.00	613.35	2.04E+02	1.60E+04	2.04E+02	1.60E+04	4.45E+02	1.51E+03	1.92E+03	6.49E+02	1.95E+04	4.66	
700.00	711.47	7.37E+01	7.26E+03	7.37E+01	7.26E+03	2.19E+02	7.86E+02	1.02E+03	2.93E+02	9.07E+03	4.01	
800.00	810.06	2.80E+01	3.39E+03	2.80E+01	3.39E+03	1.18E+02	4.42E+02	5.61E+02	1.46E+02	4.39E+03	3.38	
900.00	908.95	1.10E+01	1.64E+03	1.10E+01	1.64E+03	6.43E+01	2.48E+02	3.17E+02	7.53E+01	2.20E+03	2.89	
1000.00	1008.06	4.50E+00	8.16E+02	4.50E+00	8.16E+02	3.73E+01	1.47E+02	1.84E+02	4.18E+01	1.15E+03	2.46	
1100.00	1107.34	1.88E+00	4.18E+02	1.88E+00	4.18E+02	2.12E+01	8.43E+01	1.09E+02	2.30E+01	6.12E+02	2.16	
1200.00	1206.73	8.05E-01	2.21E+02	8.05E-01	2.21E+02	1.26E+01	5.05E+01	6.61E+01	1.34E+01	3.37E+02	1.89	

Table 64. EM-1 fission source prompt armor shielded tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		NEUTRON		GAMMA		TISSUE DOSE (RADS)				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
GROUND	SLANT											
100.00	161.84	8.59E+04	1.38E+06	2.34E+03	3.24E+03	1.94E+04	3.81E+05	8.82E+04	1.78E+06			3.42
200.00	237.05	2.03E+04	4.38E+03	7.38E+02	1.12E+03	8.73E+03	1.26E+05	2.10E+04	5.73E+05			3.23
300.00	325.87	5.00E+03	1.42E+05	2.51E+02	4.13E+02	3.96E+03	4.43E+04	5.25E+03	1.91E+05			2.93
400.00	419.75	1.40E+03	5.23E+04	9.63E+01	1.69E+02	1.87E+03	1.76E+04	1.49E+03	7.19E+04			2.67
500.00	515.94	4.34E+02	2.10E+04	4.09E+01	7.73E+01	9.19E+02	7.68E+03	4.74E+02	2.97E+04			2.42
600.00	613.35	1.46E+02	8.80E+03	1.87E+01	3.83E+01	4.70E+02	3.53E+03	1.65E+02	1.28E+04			2.18
700.00	711.47	5.25E+01	3.82E+03	9.12E+00	1.99E+01	2.49E+02	1.66E+03	6.17E+01	5.75E+03			1.97
800.00	816.06	1.99E+01	1.71E+03	4.65E+00	1.06E+01	1.37E+02	8.07E+02	2.45E+01	2.67E+03			1.80
900.00	908.95	7.82E+00	7.97E+02	2.47E+00	5.77E+00	7.74E+01	4.04E+02	1.03E+01	1.28E+03			1.64
1000.00	1008.06	3.18E+00	3.84E+02	1.35E+00	3.17E+00	4.50E+01	2.09E+02	4.53E+00	6.42E+02			1.49
1100.00	1107.34	1.33E+00	1.92E+02	7.61E-01	1.77E+00	2.67E+01	1.12E+02	2.09E+00	3.32E+02			1.37
1200.00	1206.73	5.69E-01	9.86E+01	4.38E-01	9.97E-01	1.62E+01	6.10E+01	1.01E+00	1.77E+02			1.26

Table 65. Delayed armor shielded tissue dose vs. range for
a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)	GROUND SLANT	TISSUE DOSE (RAD/S)						NEUTRON/ GAMMA RATIO		
		NEUTRON		GAMMA		SECONDARY GAMMA				
		UNCOLLECTED	TOTAL	UNCOLLECTED	TOTAL	AIR-GROUND	ARMOR			
100.00	161.84	8.64E+02	3.35E+03	5.74E+03	6.30E+03	2.55E+01	8.92E+02	6.60E+03	1.06E+04	0.46
200.00	237.05	1.92E+02	1.75E+03	2.24E+03	2.82E+03	2.47E+01	4.55E+02	2.44E+03	5.05E+03	0.53
300.00	325.87	3.27E+01	6.75E+02	8.69E+02	1.23E+03	2.33E+01	1.76E+02	9.01E+02	2.11E+03	0.47
400.00	419.75	6.91E+00	2.32E+02	3.67E+02	5.74E+02	1.47E+01	6.73E+01	3.74E+02	9.68E+02	0.36
500.00	513.34	1.40E+00	1.05E+02	1.76E+02	2.93E+02	8.83E+00	2.84E+01	1.77E+02	4.51E+02	0.31
600.00	613.35	4.57E+01	4.55E+01	3.73E+01	1.69E+02	5.26E+00	1.20E+01	3.78E+01	2.23E+02	0.26
700.00	711.47	1.10E+01	2.63E+01	4.47E+01	3.32E+01	3.92E+00	5.07E+00	4.49E+01	1.17E+02	0.21
800.00	810.36	3.45E+02	1.61E+01	2.51E+01	5.26E+01	1.87E+00	2.41E+00	2.51E+01	6.70E+01	0.18
900.00	903.97	1.02E+02	4.93E+00	1.41E+01	3.11E+01	1.15E+00	1.16E+00	1.41E+01	3.34E+01	0.15
1000.00	1000.76	3.44E+03	2.64E+00	3.44E+00	1.95E+01	7.39E+01	6.02E+01	3.45E+00	2.35E+01	0.13
1100.00	1107.34	9.96E+04	1.20E+00	4.37E+00	1.17E+01	4.67E+01	2.79E+01	4.87E+00	1.37E+01	0.11
1200.00	1206.73	3.22E+04	6.84E+01	2.95E+00	7.39E+00	3.07E+01	1.39E+01	2.95E+00	8.43E+00	0.09

Table 66. EM-1 fission source prompt plus delayed armor shielded tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

TISSUE DOSE (RADS)												
RANGE (METERS)		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	161.84	3.67E+04	1.38E+06	8.07E+03	9.54E+03	1.95E+04	3.82E+05	9.48E+04	1.79E+06	3.36		
200.00	237.05	2.04E+04	4.39E+05	2.92E+03	3.93E+03	6.76E+03	1.26E+05	2.34E+04	5.78E+05	3.17		
300.00	323.87	5.03E+03	1.43E+05	1.12E+03	1.64E+03	3.99E+03	4.44E+04	6.15E+03	1.93E+05	2.86		
400.00	419.75	1.40E+03	5.26E+04	4.63E+02	7.43E+02	1.85E+03	1.76E+04	1.87E+03	7.28E+04	2.60		
500.00	515.94	4.35E+02	2.11E+04	2.16E+02	3.75E+02	9.28E+02	7.77E+03	6.52E+02	3.02E+04	2.34		
600.00	613.35	1.47E+02	8.84E+03	1.06E+02	1.98E+02	4.75E+02	3.54E+03	2.53E+02	1.31E+04	2.10		
700.00	711.47	5.24E+01	3.84E+03	5.39E+01	1.08E+02	2.52E+02	1.67E+03	1.07E+02	5.87E+03	1.89		
800.00	810.06	1.94E+01	1.72E+03	2.97E+01	6.32E+01	1.39E+02	8.10E+02	4.94E+01	2.74E+03	1.70		
900.00	905.95	7.63E+00	8.02E+02	1.66E+01	3.69E+01	7.85E+01	4.05E+02	2.44E+01	1.32E+03	1.54		
1000.00	1009.06	3.19E+00	3.67E+02	9.80E+00	2.27E+01	4.57E+01	2.10E+02	1.30E+01	6.65E+02	1.39		
1100.00	1107.34	1.33E+00	1.93E+02	5.63E+00	1.54E+01	2.72E+01	1.12E+02	6.97E+00	3.46E+02	1.27		
1200.00	1206.73	5.60E-01	9.93E+01	3.39E+00	8.30E+00	1.65E+01	6.11E+01	3.96E+00	1.85E+02	1.15		

Table 67. Low yield thermonuclear source prompt free-field tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON/ GAMMA RATIO		
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA	
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND		UNCOLLIDED	TOTAL	
100.00	161.84	1.51E+05	1.90E+06	6.25E+04	1.16E+05	1.91E+05		2.14E+05	2.21E+06	6.19
200.00	237.05	3.71E+04	6.52E+05	2.00E+04	4.21E+04	7.61E+04		5.70E+04	7.70E+05	5.51
300.00	325.87	9.47E+03	2.32E+05	6.84E+03	1.61E+04	3.06E+04		1.63E+04	2.79E+05	4.97
400.00	419.75	2.71E+03	9.61E+04	2.64E+03	6.72E+03	1.34E+04		5.35E+03	1.16E+06	4.78
500.00	515.94	8.58E+02	4.26E+04	1.12E+03	3.10E+03	6.38E+03		1.98E+03	5.21E+04	4.49
600.00	613.35	2.92E+02	1.91E+04	5.09E+02	1.54E+03	3.26E+03		8.02E+02	2.39E+04	3.99
700.00	711.47	1.06E+02	8.78E+03	2.45E+02	7.94E+02	1.75E+03		3.51E+02	1.13E+04	3.45
800.00	810.06	4.00E+01	4.16E+03	1.23E+02	4.16E+02	9.80E+02		1.64E+02	5.55E+03	2.97
900.00	908.95	1.57E+01	2.04E+03	6.44E+01	2.23E+02	5.65E+02		8.02E+01	2.83E+03	2.59
1000.00	1003.06	6.37E+00	1.04E+03	3.47E+01	1.20E+02	3.34E+02		4.10E+01	1.49E+03	2.29
1100.00	1107.34	2.65E+00	5.44E+02	1.91E+01	6.49E+01	2.02E+02		2.18E+01	8.10E+02	2.04
1200.00	1206.73	1.12E+00	2.92E+02	1.08E+01	3.56E+01	1.24E+02		1.19E+01	4.52E+02	1.83

Table 68. Delayed free-field tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL		
100.00	161.84	4.80E+02	2.01E+03	1.74E+04	2.36E+04	4.97E+01	1.79E+04	2.57E+04	1.79E+04	2.57E+04	0.08	
200.00	237.95	1.11E+02	1.08E+03	6.25E+03	1.14E+04	5.65E+01	6.36E+03	1.26E+04	6.36E+03	1.26E+04	0.09	
300.00	325.87	1.85E+01	4.83E+02	2.18E+03	5.20E+03	4.60E+01	2.20E+03	5.73E+03	2.20E+03	5.73E+03	0.09	
400.00	419.75	3.95E+00	2.09E+02	8.56E+02	2.40E+03	2.92E+01	8.60E+02	2.64E+03	8.60E+02	2.64E+03	0.09	
500.00	515.94	1.03E+00	9.80E+01	3.89E+02	1.20E+03	1.77E+01	3.90E+02	1.32E+03	3.90E+02	1.32E+03	0.08	
600.00	613.35	2.57E-01	4.65E+01	1.85E+02	6.22E+02	1.05E+01	1.85E+02	6.79E+02	1.85E+02	6.79E+02	0.07	
700.00	711.47	6.52E-02	2.19E+01	9.18E+01	3.28E+02	6.05E+00	9.19E+01	3.56E+02	9.19E+01	3.56E+02	0.07	
800.00	810.06	1.99E-02	1.15E+01	5.00E+01	1.88E+02	3.76E+00	5.60E+01	2.03E+02	5.60E+01	2.03E+02	0.06	
900.00	908.95	5.83E-03	5.69E+00	2.76E+01	1.07E+02	2.30E+00	2.76E+01	1.15E+02	2.76E+01	1.15E+02	0.05	
1000.00	1008.06	1.98E-03	3.04E+00	1.62E+01	6.48E+01	1.48E+00	1.62E+01	6.93E+01	1.62E+01	6.93E+01	0.05	
1100.00	1107.34	5.74E-04	1.42E+00	9.22E+00	3.74E+01	9.33E-01	9.22E+00	3.98E+01	9.22E+00	3.98E+01	0.04	
1200.00	1206.73	1.86E-04	7.06E-01	5.50E+00	2.27E+01	6.11E-01	5.50E+00	2.40E+01	5.50E+00	2.40E+01	0.03	

Table 69. Low yield thermonuclear source prompt plus delayed free-field tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)			TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		TOTAL			
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL					
100.00	161.84	1.52E+05	1.90E+06	8.00E+04	1.40E+05			1.91E+05	2.32E+05	2.23E+06	5.75		
200.00	237.05	3.72E+04	6.53E+05	2.62E+04	5.36E+04			7.61E+04	6.34E+04	7.82E+05	5.03		
300.00	325.87	9.48E+03	2.33E+05	9.02E+03	2.13E+04			3.06E+04	1.85E+04	2.85E+05	4.48		
400.00	419.75	2.72E+03	9.63E+04	3.49E+03	9.12E+03			1.34E+04	6.21E+03	1.19E+05	4.27		
500.00	515.94	8.59E+02	4.27E+04	1.51E+03	4.30E+03			6.40E+03	2.37E+03	5.34E+04	3.99		
600.00	613.35	2.93E+02	1.92E+04	6.94E+02	2.16E+03			3.27E+03	9.87E+02	2.46E+04	3.53		
700.00	711.47	1.06E+02	8.80E+03	3.37E+02	1.12E+03			1.76E+03	4.43E+02	1.17E+04	3.06		
800.00	810.06	4.01E+01	4.17E+03	1.73E+02	6.06E+02			9.04E+02	2.14E+02	5.76E+03	2.62		
900.00	908.95	1.57E+01	2.05E+03	9.20E+01	3.30E+02			5.67E+02	1.08E+02	2.95E+03	2.28		
1000.00	1008.06	6.38E+00	1.04E+03	5.09E+01	1.84E+02			3.36E+02	5.73E+01	1.56E+03	2.00		
1100.00	1107.34	2.65E+00	5.45E+02	2.84E+01	1.02E+02			2.03E+02	3.10E+01	8.50E+02	1.79		
1200.00	1206.73	1.12E+00	2.93E+02	1.63E+01	5.83E+01			1.25E+02	1.74E+01	4.76E+02	1.60		

Table 70. Low yield thermonuclear source prompt armor shielded tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		NEUTRON				GAMMA				SECONDARY GAMMA				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL			
100.00	161.84	1.12E+05	1.60E+06	1.49E+04	1.95E+04	4.84E+04	6.54E+05	1.27E+05	2.32E+06					2.21		
200.00	237.05	2.71E+04	5.13E+05	4.87E+03	6.95E+03	1.92E+04	2.04E+05	3.19E+04	7.43E+05					2.23		
300.00	325.87	6.83E+03	1.70E+05	1.71E+03	2.67E+03	7.67E+03	6.85E+04	8.54E+03	2.49E+05					2.16		
400.00	419.75	1.94E+03	6.34E+04	6.74E+02	1.12E+03	3.32E+03	2.66E+04	2.61E+03	9.44E+04					2.04		
500.00	515.94	6.08E+02	2.58E+04	2.91E+02	5.25E+02	1.50E+03	1.13E+04	8.99E+02	3.92E+04					1.93		
600.00	613.35	2.06E+02	1.09E+04	1.35E+02	2.66E+02	8.05E+02	4.68E+03	3.41E+02	1.67E+04					1.90		
700.00	711.47	7.43E+01	4.82E+03	6.58E+01	1.40E+02	4.33E+02	2.15E+03	1.40E+02	7.54E+03					1.77		
800.00	810.06	2.61E+01	2.20E+03	3.36E+01	7.56E+01	2.43E+02	1.02E+03	6.16E+01	3.53E+03					1.65		
900.00	908.95	1.10E+01	1.04E+03	1.77E+01	4.12E+01	1.40E+02	4.99E+02	2.87E+01	1.72E+03					1.53		
1000.00	1008.06	4.46E+00	5.08E+02	9.62E+00	2.27E+01	8.35E+01	2.53E+02	1.41E+01	8.67E+02					1.41		
1100.00	1107.34	1.85E+00	2.57E+02	5.36E+00	1.26E+01	5.07E+01	1.33E+02	7.21E+00	4.53E+02					1.31		
1200.00	1206.73	7.84E-01	1.34E+02	3.04E+00	7.04E+00	3.13E+01	7.23E+01	3.83E+00	2.44E+02					1.21		

Table 71. Delayed armor shielded tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		NEUTRON		GAMMA		TISSUE DOSE (RADS)				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	161.84	4.32E+02	1.68E+03	2.87E+03	3.15E+03	1.28E+01	4.46E+02	3.30E+03	5.29E+03	0.46		
200.00	237.05	9.96E+01	8.77E+02	1.12E+03	1.41E+03	1.43E+01	2.27E+02	1.22E+03	2.53E+03	0.53		
300.00	325.87	1.63E+01	3.37E+02	4.34E+02	6.16E+02	1.16E+01	8.79E+01	4.51E+02	1.05E+03	0.47		
400.00	419.75	3.46E+00	1.26E+02	1.83E+02	2.87E+02	7.36E+00	3.36E+01	1.87E+02	4.54E+02	0.38		
500.00	515.94	8.99E-01	5.26E+01	8.78E+01	1.49E+02	4.44E+00	1.42E+01	8.87E+01	2.20E+02	0.31		
600.00	613.35	2.24E-01	2.28E+01	4.37E+01	8.00E+01	2.63E+00	5.98E+00	4.39E+01	1.11E+02	0.26		
700.00	711.47	5.67E-02	1.02E+01	2.24E+01	4.41E+01	1.51E+00	2.53E+00	2.24E+01	5.83E+01	0.21		
800.00	810.06	1.73E-02	5.05E+00	1.25E+01	2.63E+01	9.36E-01	1.20E+00	1.26E+01	3.35E+01	0.18		
900.00	908.95	5.11E-03	2.49E+00	7.06E+00	1.56E+01	5.73E-01	5.79E-01	7.06E+00	1.92E+01	0.15		
1000.00	1008.66	1.72E-03	1.32E+00	4.22E+00	9.74E+00	3.70E-01	3.01E-01	4.22E+00	1.17E+01	0.13		
1100.00	1107.34	4.98E-04	6.52E-01	2.44E+00	5.83E+00	2.33E-01	1.40E-01	2.44E+00	6.86E+00	0.11		
1200.00	1206.73	1.61E-04	3.42E-01	1.47E+00	3.65E+00	1.53E-01	6.93E-02	1.47E+00	4.21E+00	0.09		

Table 72. Low yield thermonuclear source prompt plus delayed armor shielded tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

TISSUE DOSE (RADS)												
RANGE (METERS)		NEUTRON		GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO	
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	161.84	1.12E+05	1.60E+06	1.77E+04	2.27E+04	4.04E+04	6.54E+05	1.30E+05	2.32E+06	2.20		
200.00	237.05	2.72E+04	5.14E+05	5.99E+03	8.36E+03	1.92E+04	2.04E+05	3.32E+04	7.46E+05	2.22		
300.00	325.67	6.84E+03	1.71E+05	2.14E+03	3.29E+03	7.68E+03	6.86E+04	8.99E+03	2.50E+05	2.14		
400.00	419.75	1.94E+03	6.35E+04	8.57E+02	1.41E+03	3.33E+03	2.66E+04	2.80E+03	9.49E+04	2.02		
500.00	515.94	6.09E+02	2.58E+04	3.79E+02	6.74E+02	1.58E+03	1.13E+04	9.88E+02	3.94E+04	1.91		
600.00	613.35	2.07E+02	1.10E+04	1.78E+02	3.46E+02	8.08E+02	4.69E+03	3.85E+02	1.68E+04	1.88		
700.00	711.47	7.44E+01	4.83E+03	8.82E+01	1.84E+02	4.35E+02	2.15E+03	1.63E+02	7.60E+03	1.75		
800.00	810.06	2.81E+01	2.20E+03	4.61E+01	1.02E+02	2.44E+02	1.02E+03	7.42E+01	3.57E+03	1.62		
900.00	908.95	1.10E+01	1.04E+03	2.48E+01	5.68E+01	1.41E+02	5.00E+02	3.58E+01	1.74E+03	1.49		
1000.00	1008.06	4.46E+00	5.09E+02	1.38E+01	3.24E+01	8.39E+01	2.54E+02	1.83E+01	8.79E+02	1.38		
1100.00	1107.34	1.85E+00	2.58E+02	7.79E+00	1.84E+01	5.09E+01	1.33E+02	9.64E+00	4.60E+02	1.28		
1200.00	1206.73	7.84E-01	1.34E+02	4.52E+00	1.07E+01	3.14E+01	7.24E+01	5.30E+00	2.49E+02	1.17		

Table 73. Henke source prompt free-field tissue dose vs. range for a
10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		NEUTRON				GAMMA				SECONDARY GAMMA				NEUTRON / GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL		
100.00	161.84	5.16E+06	2.79E+07	1.00E+05	1.75E+05	2.66E+06			5.26E+06	3.07E+07			9.84	
200.00	237.05	1.36E+06	1.05E+07	3.36E+04	6.43E+04	1.06E+06			1.39E+06	1.16E+07			9.30	
300.00	325.87	3.67E+05	4.12E+06	1.23E+04	2.53E+04	4.77E+05			3.79E+05	4.62E+06			8.20	
400.00	419.75	1.09E+05	1.73E+06	5.09E+03	1.09E+04	2.43E+05			1.14E+05	1.99E+06			6.83	
500.00	515.94	3.49E+04	7.92E+05	2.34E+03	5.24E+03	1.31E+05			3.72E+04	9.27E+05			5.83	
600.00	613.35	1.19E+04	3.82E+05	1.16E+03	2.74E+03	7.26E+04			1.30E+04	4.58E+05			5.08	
700.00	711.47	4.24E+03	1.91E+05	6.08E+02	1.51E+03	4.14E+04			4.85E+03	2.34E+05			4.45	
800.00	810.06	1.57E+03	9.85E+04	3.34E+02	8.52E+02	2.42E+04			1.91E+03	1.24E+05			3.93	
900.00	908.95	6.00E+02	5.23E+04	1.90E+02	4.90E+02	1.44E+04			7.90E+02	6.72E+04			3.50	
1000.00	1008.06	2.35E+02	2.86E+04	1.12E+02	2.86E+02	8.76E+03			3.47E+02	3.76E+04			3.16	
1100.00	1107.34	9.38E+01	1.61E+04	6.74E+01	1.68E+02	5.39E+03			1.61E+02	2.16E+04			2.89	
1200.00	1206.73	3.82E+01	9.15E+03	4.14E+01	1.00E+02	3.34E+03			7.96E+01	1.26E+04			2.66	

Table 74. Delayed free-field tissue dose vs. range for a 10.0 KT
 weapon burst 129.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO	
		NEUTRON				GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA			
		GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	UNCOLLIDED		TOTAL
100.00	161.84			9.61E+01	4.02E+02	3.49E+03	4.73E+03			9.93E+00	3.59E+03	5.14E+03	0.08
200.00	237.05			2.23E+01	2.15E+02	1.25E+03	2.29E+03			1.13E+01	1.27E+03	2.51E+03	0.09
300.00	325.87			3.71E+00	9.66E+01	4.36E+02	1.04E+03			9.20E+00	4.39E+02	1.15E+03	0.09
400.00	419.75			7.89E-01	4.18E+01	1.71E+02	4.86E+02			5.84E+00	1.72E+02	5.27E+02	0.09
500.00	515.94			2.06E-01	1.96E+01	7.79E+01	2.41E+02			3.54E+00	7.81E+01	2.64E+02	0.08
600.00	613.35			5.15E-02	9.29E+00	3.70E+01	1.24E+02			2.10E+00	3.71E+01	1.36E+02	0.07
700.00	711.47			1.30E-02	4.39E+00	1.84E+01	6.55E+01			1.21E+00	1.84E+01	7.11E+01	0.07
800.00	810.06			3.97E-03	2.29E+00	1.00E+01	3.76E+01			7.51E-01	1.00E+01	4.06E+01	0.06
900.00	908.95			1.18E-03	1.14E+00	5.52E+00	2.14E+01			4.60E-01	5.52E+00	2.30E+01	0.05
1000.00	1008.06			3.96E-04	6.08E-01	3.24E+00	1.30E+01			2.97E-01	3.24E+00	1.39E+01	0.05
1100.00	1107.34			1.15E-04	2.84E-01	1.84E+00	7.49E+00			1.87E-01	1.84E+00	7.96E+00	0.04
1200.00	1206.73			3.71E-05	1.41E-01	1.10E+00	4.54E+00			1.22E-01	1.10E+00	4.80E+00	0.03

Table 75. Henre source prompt plus delayed free-field tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)				NEUTRON/ GAMMA RATIO			
GROUND	SLANT	NEUTRON		GAMMA			SECONDARY GAMMA		NEUTRON PLUS GAMMA
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND		UNCOLLIDED	TOTAL
100.00	161.84	5.16E+06	2.79E+07	1.04E+05	1.80E+05	2.66E+06		5.26E+06	3.07E+07
200.00	237.05	1.36E+06	1.05E+07	3.49E+04	6.66E+04	1.06E+06		1.39E+06	1.16E+07
300.00	325.87	3.67E+05	4.12E+06	1.27E+04	2.63E+04	4.77E+05		3.80E+05	4.63E+06
400.00	419.75	1.09E+05	1.73E+06	5.26E+03	1.14E+04	2.43E+05		1.14E+05	1.99E+06
500.00	515.94	3.49E+04	7.92E+05	2.41E+03	5.48E+03	1.31E+05		3.73E+04	9.28E+05
600.00	613.35	1.19E+04	3.82E+05	1.19E+03	2.87E+03	7.26E+04		1.31E+04	4.58E+05
700.00	711.47	4.24E+03	1.91E+05	6.26E+02	1.57E+03	4.14E+04		4.87E+03	2.34E+05
800.00	810.06	1.57E+03	9.85E+04	3.44E+02	8.90E+02	2.42E+04		1.92E+03	1.24E+05
900.00	908.93	6.00E+02	5.23E+04	1.96E+02	5.12E+02	1.45E+04		7.96E+02	6.72E+04
1000.00	1008.06	2.35E+02	2.86E+04	1.15E+02	2.99E+02	8.76E+03		3.50E+02	3.76E+04
1100.00	1107.34	9.38E+01	1.61E+04	6.92E+01	1.76E+02	5.39E+03		1.63E+02	2.16E+04
1200.00	1206.73	3.82E+01	9.15E+03	4.25E+01	1.05E+02	3.34E+03		8.07E+01	1.26E+04

Table 76. Henre source prompt armor shielded tissue dose vs. range for
a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)				NEUTRON/ GAMMA RATIO				
		NEUTRON		GAMMA						
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	NEUTRON PLUS GAMMA				
				AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	161.84	3.48E+06	2.20E+07	2.55E+04	3.19E+04	6.61E+05	1.86E+06	3.51E+06	2.45E+07	8.61
200.00	237.05	9.18E+05	8.38E+06	8.81E+03	1.18E+04	2.61E+05	7.40E+05	9.27E+05	9.39E+06	8.27
300.00	325.87	2.48E+05	3.28E+06	3.32E+03	4.78E+03	1.17E+05	2.97E+05	2.51E+05	3.70E+06	7.84
400.00	419.75	7.35E+04	1.35E+06	1.41E+03	2.13E+03	5.91E+04	1.60E+05	7.49E+04	1.57E+06	6.09
500.00	515.94	2.36E+04	5.88E+05	6.60E+02	1.06E+03	3.18E+04	7.88E+04	2.42E+04	7.00E+05	5.27
600.00	613.35	8.02E+03	2.70E+05	3.32E+02	5.73E+02	1.77E+04	3.95E+04	8.36E+03	3.27E+05	4.67
700.00	711.47	2.86E+03	1.27E+05	1.76E+02	3.25E+02	1.01E+04	2.05E+04	3.04E+03	1.58E+05	4.11
800.00	810.06	1.06E+03	6.17E+04	9.78E+01	1.89E+02	5.94E+03	1.10E+04	1.16E+03	7.89E+04	3.60
900.00	908.95	4.05E+02	3.08E+04	5.62E+01	1.12E+02	3.56E+03	6.10E+03	4.61E+02	4.05E+04	3.15
1000.00	1008.06	1.58E+02	1.58E+04	3.32E+01	6.66E+01	2.17E+03	3.41E+03	1.92E+02	2.14E+04	2.80
1100.00	1107.34	6.33E+01	8.36E+03	2.01E+01	4.01E+01	1.34E+03	1.93E+03	8.34E+01	1.17E+04	2.53
1200.00	1206.73	2.58E+01	4.51E+03	1.24E+01	2.44E+01	8.33E+02	1.10E+03	3.82E+01	6.47E+03	2.31

Table 77. Delayed armor shielded tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

TISSUE DOSE (RADS)													
RANGE (METERS)		NEUTRON			GAMMA			SECONDARY GAMMA			NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL				
100.00	161.84	8.64E+01	3.35E+02	5.74E+02	6.30E+02	2.55E+00	8.92E+01	6.60E+02	1.06E+03	0.46			
200.00	237.05	1.99E+01	1.75E+02	2.24E+02	2.82E+02	2.87E+00	4.55E+01	2.44E+02	5.05E+02	0.53			
300.00	325.87	3.27E+00	6.75E+01	8.69E+01	1.23E+02	2.33E+00	1.76E+01	9.01E+01	2.11E+02	0.47			
400.00	419.75	6.91E-01	2.52E+01	3.67E+01	5.74E+01	1.47E+00	6.73E+00	3.74E+01	9.08E+01	0.38			
500.00	515.94	1.80E-01	1.05E+01	1.76E+01	2.98E+01	8.88E-01	2.84E+00	1.77E+01	4.41E+01	0.31			
600.00	613.35	4.48E-02	4.55E+00	8.73E+00	1.60E+01	5.26E-01	1.20E+00	8.78E+00	2.23E+01	0.26			
700.00	711.47	1.13E-02	2.03E+00	4.47E+00	8.82E+00	3.02E-01	5.07E-01	4.49E+00	1.17E+01	0.21			
800.00	810.06	3.45E-03	1.01E+00	2.51E+00	5.26E+00	1.87E-01	2.41E-01	2.51E+00	6.70E+00	0.18			
900.00	903.95	1.02E-03	4.98E-01	1.41E+00	3.11E+00	1.15E-01	1.16E-01	1.41E+00	3.84E+00	0.15			
1000.00	1008.06	3.44E-04	2.64E-01	8.44E-01	1.95E+00	7.39E-02	6.02E-02	8.45E-01	2.35E+00	0.13			
1100.00	1107.34	9.96E-05	1.30E-01	4.87E-01	1.17E+00	4.67E-02	2.79E-02	4.87E-01	1.37E+00	0.11			
1200.00	1206.73	3.22E-05	6.84E-02	2.95E-01	7.30E-01	3.07E-02	1.39E-02	2.95E-01	8.43E-01	0.09			

Table 78. Henre source prompt plus delayed armor shielded tissue dose vs. range for a 10.0 KT weapon burst 129.00 meters above ground.

RANGE (METERS)		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	
100.00	161.84	3.48E+06	2.20E+07	2.60E+04	3.26E+04	6.61E+05	1.86E+06	3.51E+06	2.45E+07	8.61
200.00	237.05	9.18E+05	8.38E+06	9.04E+03	1.21E+04	2.61E+05	7.40E+05	9.27E+05	9.39E+06	8.27
300.00	325.87	2.48E+05	3.28E+06	3.40E+03	4.91E+03	1.17E+05	2.97E+05	2.51E+05	3.70E+06	7.84
400.00	419.75	7.35E+04	1.35E+06	1.45E+03	2.19E+03	5.91E+04	1.60E+05	7.49E+04	1.57E+06	6.09
500.00	515.94	2.36E+04	5.88E+05	6.77E+02	1.09E+03	3.18E+04	7.88E+04	2.42E+04	7.00E+05	5.26
600.00	613.35	8.02E+03	2.70E+05	3.41E+02	5.89E+02	1.77E+04	3.95E+04	8.36E+03	3.27E+05	4.67
700.00	711.47	2.86E+03	1.27E+05	1.81E+02	3.34E+02	1.01E+04	2.05E+04	3.04E+03	1.58E+05	4.11
800.00	810.06	1.06E+03	6.17E+04	1.00E+02	1.95E+02	5.94E+03	1.10E+04	1.16E+03	7.89E+04	3.60
900.00	908.95	4.05E+02	3.06E+04	5.76E+01	1.15E+02	3.56E+03	6.10E+03	4.62E+02	4.05E+04	3.15
1000.00	1008.06	1.58E+02	1.58E+04	3.40E+01	6.86E+01	2.17E+03	3.41E+03	1.92E+02	2.14E+04	2.80
1100.00	1107.34	6.33E+01	8.36E+03	2.06E+01	4.13E+01	1.34E+03	1.93E+03	8.39E+01	1.17E+04	2.53
1200.00	1206.73	2.58E+01	4.51E+03	1.27E+01	2.51E+01	8.33E+02	1.10E+03	3.85E+01	6.47E+03	2.30

Table 79. EM-1 fission source prompt free-field tissue dose vs. range
for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)				NEUTRON/ GAMMA RATIO		
		NEUTRON		GAMMA			NEUTRON PLUS GAMMA	
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL
100.00	209.64	1.32E+05	2.55E+06	1.63E+04	4.50E+04	1.50E+05	1.49E+05	2.74E+06
200.00	271.93	4.59E+04	1.25E+06	6.70E+03	2.20E+04	8.58E+04	5.26E+04	1.36E+06
300.00	352.06	1.41E+04	4.98E+05	2.55E+03	8.63E+03	4.24E+04	1.66E+04	5.49E+05
400.00	440.40	4.44E+03	2.08E+05	1.02E+03	3.63E+03	2.13E+04	5.46E+03	2.33E+05
500.00	532.87	1.48E+03	9.39E+04	4.37E+02	1.58E+03	1.09E+04	1.92E+03	1.06E+05
600.00	627.65	5.24E+02	4.66E+04	2.00E+02	7.28E+02	5.72E+03	7.24E+02	5.31E+04
700.00	723.84	1.95E+02	2.37E+04	9.66E+01	3.60E+02	3.10E+03	2.91E+02	2.72E+04
800.00	820.94	7.54E+01	1.18E+04	4.88E+01	1.87E+02	1.72E+03	1.24E+02	1.37E+04
900.00	918.67	3.02E+01	5.86E+03	2.57E+01	1.01E+02	9.84E+02	5.59E+01	6.95E+03
1000.00	1016.83	1.25E+01	2.94E+03	1.40E+01	5.56E+01	5.75E+02	2.64E+01	3.57E+03
1100.00	1115.32	5.27E+00	1.50E+03	7.80E+00	3.13E+01	3.43E+02	1.31E+01	1.88E+03
1200.00	1214.06	2.27E+00	7.83E+02	4.47E+00	1.79E+01	2.09E+02	6.74E+00	1.01E+03

Table 80. Delayed free-field tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON			GAMMA			SECONDARY GAMMA			NEUTRON PLUS GAMMA	
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL
100.00	209.64	1.70E+03	8.72E+03	7.13E+04	1.04E+05	2.19E+02	2.19E+02	7.30E+04	1.13E+05	0.08		
200.00	271.93	6.68E+02	5.67E+03	3.66E+04	6.35E+04	2.45E+02	2.45E+02	3.73E+04	6.95E+04	0.09		
300.00	352.06	2.26E+02	3.29E+03	1.82E+04	3.69E+04	2.69E+02	2.69E+02	1.84E+04	4.04E+04	0.09		
400.00	440.40	6.88E+01	1.75E+03	8.45E+03	2.00E+04	1.60E+02	1.60E+02	8.52E+03	2.19E+04	0.09		
500.00	532.87	1.67E+01	8.70E+02	3.72E+03	1.03E+04	1.12E+02	1.12E+02	3.73E+03	1.13E+04	0.08		
600.00	627.65	3.97E+00	4.19E+02	1.70E+03	5.29E+03	7.17E+01	7.17E+01	1.70E+03	5.78E+03	0.08		
700.00	723.84	9.07E-01	1.89E+02	7.85E+02	2.61E+03	4.10E+01	4.10E+01	7.85E+02	2.85E+03	0.07		
800.00	820.94	2.52E-01	9.50E+01	4.02E+02	1.42E+03	2.53E+01	2.53E+01	4.02E+02	1.54E+03	0.07		
900.00	918.67	7.00E-02	4.50E+01	2.11E+02	7.62E+02	1.50E+01	1.50E+01	2.11E+02	8.22E+02	0.06		
1000.00	1016.83	2.22E-02	2.30E+01	1.18E+02	4.37E+02	9.37E+00	9.37E+00	1.18E+02	4.69E+02	0.05		
1100.00	1113.32	6.28E-03	1.07E+01	6.52E+01	2.44E+02	5.74E+00	5.74E+00	6.52E+01	2.60E+02	0.04		
1200.00	1214.06	1.98E-03	5.33E+00	3.78E+01	1.43E+02	3.67E+00	3.67E+00	3.78E+01	1.52E+02	0.04		

Table 81. EM-1 fission source prompt plus delayed free-field tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL		
100.00	209.64	1.34E+05	2.55E+06	8.76E+04	1.49E+05	1.50E+05	2.22E+05	2.85E+06	2.22E+05	2.85E+06	8.53	
200.00	271.93	4.66E+04	1.26E+06	4.33E+04	8.56E+04	8.60E+04	8.99E+04	1.43E+06	8.99E+04	1.43E+06	7.34	
300.00	352.06	1.43E+04	5.01E+05	2.07E+04	4.55E+04	4.26E+04	3.50E+04	5.90E+05	3.50E+04	5.90E+05	5.69	
400.00	440.40	4.51E+03	2.10E+05	9.47E+03	2.37E+04	2.14E+04	1.40E+04	2.55E+05	1.40E+04	2.55E+05	4.65	
500.00	532.87	1.50E+03	9.48E+04	4.15E+03	1.19E+04	1.10E+04	5.65E+03	1.18E+05	5.65E+03	1.18E+05	4.14	
600.00	627.65	5.28E+02	4.71E+04	1.90E+03	6.02E+03	5.79E+03	2.43E+03	5.89E+04	2.43E+03	5.89E+04	3.99	
700.00	723.84	1.96E+02	2.39E+04	8.81E+02	2.97E+03	3.14E+03	1.08E+03	3.00E+04	1.08E+03	3.00E+04	3.91	
800.00	820.94	7.57E+01	1.19E+04	4.51E+02	1.61E+03	1.75E+03	5.27E+02	1.53E+04	5.27E+02	1.53E+04	3.55	
900.00	918.67	3.03E+01	5.91E+03	2.37E+02	8.63E+02	9.99E+02	2.67E+02	7.77E+03	2.67E+02	7.77E+03	3.17	
1000.00	1016.83	1.25E+01	2.96E+03	1.32E+02	4.92E+02	5.84E+02	1.45E+02	4.04E+03	1.45E+02	4.04E+03	2.75	
1100.00	1115.32	5.27E+00	1.51E+03	7.30E+01	2.75E+02	3.49E+02	7.83E+01	2.14E+03	7.83E+01	2.14E+03	2.42	
1200.00	1214.06	2.27E+00	7.88E+02	4.23E+01	1.61E+02	2.12E+02	4.46E+01	1.16E+03	4.46E+01	1.16E+03	2.11	

Table 82. EM-1 fission source prompt armor shielded tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)							NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA	
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL
100.00	209.64	9.90E+04	2.10E+06	3.25E+03	4.81E+03	3.76E+04	6.13E+05	1.02E+05	2.76E+06
200.00	271.93	3.40E+04	9.55E+05	1.41E+03	2.31E+03	2.14E+04	2.90E+05	3.54E+04	1.27E+06
300.00	352.06	1.03E+04	3.54E+05	5.66E+02	9.72E+02	1.66E+04	1.13E+05	1.09E+04	4.78E+05
400.00	440.40	3.22E+03	1.37E+05	2.38E+02	4.39E+02	5.29E+03	4.72E+04	3.46E+03	1.90E+05
500.00	532.87	1.07E+03	5.66E+04	1.06E+02	2.04E+02	2.70E+03	2.09E+04	1.18E+03	8.05E+04
600.00	627.65	3.76E+02	2.53E+04	5.04E+01	1.00E+02	1.42E+03	1.01E+04	4.26E+02	3.69E+04
700.00	723.84	1.39E+02	1.18E+04	2.51E+01	5.28E+01	7.67E+02	5.16E+03	1.64E+02	1.78E+04
800.00	820.94	5.36E+01	5.62E+03	1.30E+01	2.92E+01	4.27E+02	2.69E+03	6.66E+01	8.77E+03
900.00	918.67	2.14E+01	2.70E+03	6.96E+00	1.66E+01	2.44E+02	1.40E+03	2.84E+01	4.36E+03
1000.00	1016.83	8.83E+00	1.32E+03	3.85E+00	9.69E+00	1.43E+02	7.37E+02	1.27E+01	2.21E+03
1100.00	1115.32	3.72E+00	6.64E+02	2.10E+00	5.71E+00	8.56E+01	3.95E+02	5.90E+00	1.15E+03
1200.00	1214.06	1.60E+00	3.41E+02	1.26E+00	3.39E+00	5.23E+01	2.15E+02	2.87E+00	6.12E+02

Table 83. Delayed armor shielded tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		NEUTRON				GAMMA				TISSUE DOSE (RADS)				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL			
100.00	209.64	1.53E+03	7.20E+03	1.19E+04	1.35E+04	5.63E+01	1.91E+03	1.35E+04	2.27E+04	0.46						
200.00	271.93	5.97E+02	4.60E+03	6.44E+03	7.87E+03	6.24E+01	1.21E+03	7.04E+03	1.37E+04	0.50						
300.00	352.06	2.01E+02	2.49E+03	3.38E+03	4.46E+03	5.32E+01	6.56E+02	3.58E+03	7.65E+03	0.48						
400.00	440.40	6.09E+01	1.21E+03	1.67E+03	2.40E+03	4.05E+01	3.21E+02	1.73E+03	3.97E+03	0.44						
500.00	532.87	1.47E+01	5.32E+02	7.88E+02	1.25E+03	2.82E+01	1.42E+02	8.02E+02	1.95E+03	0.38						
600.00	627.65	3.47E+00	2.27E+02	3.82E+02	6.59E+02	1.80E+01	6.10E+01	3.86E+02	9.65E+02	0.31						
700.00	723.84	7.90E-01	9.45E+01	1.85E+02	3.42E+02	1.03E+01	2.45E+01	1.85E+02	4.71E+02	0.25						
800.00	820.94	2.20E-01	4.42E+01	9.83E+01	1.94E+02	6.31E+00	1.11E+01	9.85E+01	2.55E+02	0.21						
900.00	913.67	6.08E-02	2.05E+01	5.29E+01	1.09E+02	3.73E+00	5.00E+00	5.29E+01	1.38E+02	0.17						
1000.00	1016.83	1.93E-02	1.03E+01	3.03E+01	6.48E+01	2.34E+00	2.45E+00	3.04E+01	7.99E+01	0.15						
1100.00	1115.32	5.45E-03	4.94E+00	1.70E+01	3.76E+01	1.43E+00	1.13E+00	1.70E+01	4.51E+01	0.12						
1200.00	1214.06	1.72E-03	2.53E+00	1.00E+01	2.28E+01	9.20E-01	5.59E-01	1.00E+01	2.68E+01	0.10						

Table 84. EM-1 fission source prompt plus delayed armor shielded tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)				NEUTRON/ GAMMA RATIO				
		NEUTRON		GAMMA			NEUTRON PLUS GAMMA			
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL			
100.00	209.64	1.01E+05	2.11E+06	1.52E+04	1.83E+04	3.77E+04	6.15E+05	1.16E+05	2.78E+06	3.14
200.00	271.93	3.46E+04	9.59E+05	7.85E+03	1.02E+04	2.15E+04	2.92E+05	4.24E+04	1.28E+06	2.97
300.00	352.06	1.05E+04	3.56E+05	3.95E+03	5.43E+03	1.07E+04	1.13E+05	1.45E+04	4.86E+05	2.75
400.00	440.40	3.28E+03	1.38E+05	1.91E+03	2.84E+03	5.33E+03	4.75E+04	5.19E+03	1.94E+05	2.49
500.00	532.87	1.08E+03	5.72E+04	8.94E+02	1.45E+03	2.72E+03	2.11E+04	1.98E+03	8.24E+04	2.26
600.00	627.65	3.79E+02	2.55E+04	4.32E+02	7.60E+02	1.44E+03	1.02E+04	8.12E+02	3.79E+04	2.06
700.00	723.84	1.40E+02	1.19E+04	2.10E+02	3.95E+02	7.78E+02	5.21E+03	3.49E+02	1.83E+04	1.87
800.00	820.94	5.39E+01	5.67E+03	1.11E+02	2.23E+02	4.33E+02	2.70E+03	1.65E+02	9.02E+03	1.69
900.00	918.67	2.15E+01	2.72E+03	5.98E+01	1.25E+02	2.48E+02	1.40E+03	8.13E+01	4.50E+03	1.53
1000.00	1016.83	8.85E+00	1.33E+03	3.42E+01	7.45E+01	1.45E+02	7.40E+02	4.30E+01	2.29E+03	1.39
1100.00	1115.32	3.73E+00	6.69E+02	1.92E+01	4.33E+01	8.70E+01	3.96E+02	2.29E+01	1.20E+03	1.27
1200.00	1214.06	1.61E+00	3.44E+02	1.13E+01	2.62E+01	5.32E+01	2.16E+02	1.29E+01	6.39E+02	1.16

Table 85. Low yield thermonuclear source prompt free-field tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)				NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	
100.00	209.64	1.79E+05	2.99E+06	3.78E+04	1.81E+05	5.65
200.00	271.93	6.31E+04	1.48E+06	3.83E+04	9.26E+04	5.43
300.00	352.06	1.97E+04	5.90E+05	1.55E+04	3.94E+04	4.94
400.00	440.40	6.29E+03	2.49E+05	6.52E+03	1.80E+04	4.47
500.00	532.87	2.12E+03	1.13E+05	2.91E+03	8.38E+03	4.18
600.00	627.65	7.53E+02	5.60E+04	1.37E+03	4.10E+03	4.04
700.00	723.84	2.80E+02	2.86E+04	6.73E+02	2.14E+03	3.80
800.00	820.94	1.08E+02	1.44E+04	3.44E+02	1.17E+03	3.40
900.00	916.67	4.31E+01	7.25E+03	1.82E+02	6.57E+02	2.97
1000.00	1016.83	1.77E+01	3.71E+03	9.86E+01	3.74E+02	2.57
1100.00	1115.32	7.40E+00	1.94E+03	5.48E+01	2.15E+02	2.24
2000.00	1214.06	3.16E+00	1.04E+03	3.11E+01	1.24E+02	1.96

Table 86. Delayed free-field tissue dose vs. range for a
30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)				NEUTRON/ GAMMA RATIO		
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA UNCOLLIDED TOTAL
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND		
100.00	209.64	8.50E+02	4.36E+03	3.57E+04	5.22E+04	1.09E+02	3.65E+04	0.08
200.00	271.93	3.34E+02	2.04E+03	1.82E+04	3.18E+04	1.22E+02	1.07E+04	0.09
300.00	352.66	1.10E+02	1.65E+03	9.60E+03	1.84E+04	1.05E+02	9.29E+03	0.09
400.00	440.40	3.64E+01	8.77E+02	4.23E+03	1.80E+04	8.91E+01	4.26E+03	0.09
500.00	532.67	8.34E+00	4.35E+02	1.86E+03	5.17E+03	5.59E+01	1.07E+03	0.08
600.00	627.65	1.90E+00	2.09E+02	8.48E+02	2.64E+03	3.59E+01	8.50E+02	0.08
700.00	727.64	4.50E-01	9.45E+01	3.92E+02	1.31E+03	2.65E+01	3.93E+02	0.07
800.00	820.94	1.24E-01	4.75E+01	2.91E+02	7.10E+02	1.26E+01	2.91E+02	0.07
900.00	918.67	3.50E-02	2.25E+01	1.05E+02	3.81E+02	7.49E+00	1.05E+02	0.06
1000.00	1016.63	1.11E-02	1.15E+01	5.92E+01	2.19E+02	4.60E+00	5.92E+01	0.05
1100.00	1115.32	3.14E-03	5.56E+00	3.26E+01	1.22E+02	2.87E+00	3.26E+01	0.04
1200.00	1214.06	9.91E-04	2.67E+00	1.89E+01	7.15E+01	1.84E+00	1.89E+01	0.04

Table 87. Low yield thermonuclear source prompt plus delayed free-field tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON/ GAMMA RATIO	
		NEUTRON		GAMMA		SECONDARY GAMMA			
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL	
100.00	209.64	1.80E+05	2.99E+06	1.23E+05	2.33E+05	3.47E+05	3.03E+05	3.57E+06	5.15
200.00	271.93	6.35E+04	1.48E+06	5.66E+04	1.24E+05	1.79E+05	1.20E+05	1.78E+06	4.87
300.00	352.06	1.98E+04	5.92E+05	2.46E+04	5.79E+04	8.03E+04	4.44E+04	7.30E+05	4.29
400.00	440.40	6.33E+03	2.50E+05	1.07E+04	2.81E+04	3.76E+04	1.71E+04	3.15E+05	3.80
500.00	532.87	2.13E+03	1.13E+05	4.77E+03	1.36E+04	1.87E+04	6.89E+03	1.46E+05	3.52
600.00	627.65	7.55E+02	5.62E+04	2.22E+03	6.75E+03	9.81E+03	2.97E+03	7.28E+04	3.40
700.00	723.84	2.80E+02	2.87E+04	1.07E+03	3.45E+03	5.40E+03	1.35E+03	3.75E+04	3.24
800.00	820.94	1.08E+02	1.44E+04	5.45E+02	1.88E+03	3.07E+03	6.53E+02	1.94E+04	2.92
900.00	918.67	4.32E+01	7.28E+03	2.87E+02	1.04E+03	1.79E+03	3.30E+02	1.01E+04	2.57
1000.00	1016.83	1.77E+01	3.72E+03	1.58E+02	5.93E+02	1.07E+03	1.75E+02	5.39E+03	2.23
1100.00	1115.32	7.41E+00	1.95E+03	8.74E+01	3.37E+02	6.55E+02	9.48E+01	2.94E+03	1.96
1200.00	1214.06	3.16E+00	1.04E+03	5.00E+01	1.96E+02	4.06E+02	5.31E+01	1.64E+03	1.73

Table 88. Low yield thermonuclear source prompt armor shielded tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON/ GAMMA RATIO	
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA	
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR- GROUND	ARMOR	UNCOLLIDED	TOTAL
100.00	209.64	1.31E+05	2.46E+06	2.12E+04	2.97E+04	8.75E+04	9.94E+05	1.53E+05	3.57E+06
200.00	271.93	4.59E+04	1.13E+06	9.43E+03	1.44E+04	4.47E+04	4.60E+05	5.53E+04	1.65E+06
300.00	352.06	1.42E+04	4.25E+05	3.89E+03	6.31E+03	2.01E+04	1.72E+05	1.81E+04	6.23E+05
400.00	440.40	4.49E+03	1.68E+05	1.67E+03	2.94E+03	9.33E+03	6.87E+04	6.16E+03	2.49E+05
500.00	532.87	1.50E+03	7.03E+04	7.59E+02	1.40E+03	4.61E+03	2.98E+04	2.26E+03	1.06E+05
600.00	627.65	5.31E+02	3.15E+04	3.63E+02	6.96E+02	2.42E+03	1.34E+04	8.93E+02	4.80E+04
700.00	723.84	1.97E+02	1.49E+04	1.81E+02	3.70E+02	1.33E+03	6.81E+03	3.70E+02	2.34E+04
800.00	820.94	7.58E+01	7.14E+03	9.36E+01	2.06E+02	7.58E+02	3.45E+03	1.69E+02	1.15E+04
900.00	918.67	3.02E+01	3.48E+03	5.00E+01	1.19E+02	4.44E+02	1.75E+03	8.01E+01	5.78E+03
1000.00	1016.83	1.24E+01	1.73E+03	2.74E+01	6.91E+01	2.67E+02	8.97E+02	3.97E+01	2.96E+03
1100.00	1115.32	5.17E+00	8.82E+02	1.53E+01	4.06E+01	1.64E+02	4.70E+02	2.05E+01	1.56E+03
1200.00	1214.96	2.21E+00	4.60E+02	8.77E+00	2.40E+01	1.02E+02	2.54E+02	1.10E+01	8.40E+02

Table 89. Delayed armor shielded tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA				NEUTRON PLUS GAMMA		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	209.64	7.63E+02	3.60E+03	5.97E+03	6.77E+03	2.82E+01	9.53E+02	6.73E+03	1.13E+04	0.46		
200.00	271.93	2.99E+02	2.30E+03	3.22E+03	3.94E+03	3.12E+01	6.06E+02	3.52E+03	6.87E+03	0.50		
300.00	352.06	1.01E+02	1.24E+03	1.69E+03	2.23E+03	2.66E+01	3.28E+02	1.79E+03	3.83E+03	0.46		
400.00	440.40	3.04E+01	6.04E+02	8.35E+02	1.20E+03	2.03E+01	1.61E+02	8.65E+02	1.98E+03	0.44		
500.00	532.87	7.33E+00	2.66E+02	3.94E+02	6.24E+02	1.41E+01	7.08E+01	4.01E+02	9.75E+02	0.38		
600.00	627.65	1.73E+00	1.14E+02	1.91E+02	3.30E+02	9.00E+00	3.05E+01	1.93E+02	4.83E+02	0.31		
700.00	723.84	3.95E-01	4.72E+01	9.23E+01	1.71E+02	5.13E+00	1.22E+01	9.27E+01	2.36E+02	0.25		
800.00	820.94	1.10E-01	2.21E+01	4.92E+01	9.68E+01	3.15E+00	5.55E+00	4.93E+01	1.28E+02	0.21		
900.00	918.67	3.04E-02	1.02E+01	2.64E+01	5.43E+01	1.87E+00	2.50E+00	2.65E+01	6.89E+01	0.17		
1000.00	1016.83	9.64E-03	5.14E+00	1.52E+01	3.24E+01	1.17E+00	1.22E+00	1.52E+01	3.99E+01	0.15		
1100.00	1115.32	2.72E-03	2.47E+00	8.51E+00	1.88E+01	7.17E-01	5.65E-01	8.51E+00	2.25E+01	0.12		
1200.00	1214.66	8.59E-04	1.27E+00	5.02E+00	1.14E+01	4.60E-01	2.80E-01	5.02E+00	1.34E+01	0.10		

Table 90. Low yield thermonuclear source prompt plus delayed armor shielded tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)				TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND		SLANT		NEUTRON		GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA			
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL			
100.00	209.64	1.32E+05	2.46E+06	2.72E+04	3.65E+04	8.75E+04	9.95E+05	1.59E+05	3.58E+06			2.20		
200.00	271.93	4.62E+04	1.13E+06	1.26E+04	1.84E+04	4.47E+04	4.61E+05	5.88E+04	1.65E+06			2.16		
300.00	352.06	1.43E+04	4.26E+05	5.59E+03	8.54E+03	2.01E+04	1.72E+05	1.98E+04	6.27E+05			2.12		
400.00	440.40	4.52E+03	1.69E+05	2.51E+03	4.14E+03	9.35E+03	6.89E+04	7.02E+03	2.51E+05			2.05		
500.00	532.87	1.51E+03	7.05E+04	1.15E+03	2.02E+03	4.62E+03	2.99E+04	2.66E+03	1.07E+05			1.93		
600.00	627.65	5.33E+02	3.16E+04	5.54E+02	1.03E+03	2.43E+03	1.34E+04	1.09E+03	4.85E+04			1.87		
700.00	723.84	1.97E+02	1.49E+04	2.73E+02	5.41E+02	1.34E+03	6.82E+03	4.70E+02	2.36E+04			1.71		
800.00	820.94	7.59E+01	7.16E+03	1.43E+02	3.03E+02	7.62E+02	3.45E+03	2.19E+02	1.17E+04			1.58		
900.00	918.67	3.02E+01	3.49E+03	7.64E+01	1.73E+02	4.46E+02	1.75E+03	1.07E+02	5.85E+03			1.47		
1000.00	1016.83	1.24E+01	1.73E+03	4.25E+01	1.02E+02	2.68E+02	8.98E+02	5.49E+01	3.00E+03			1.37		
1100.00	1115.32	5.16E+00	8.85E+02	2.38E+01	5.94E+01	1.64E+02	4.70E+02	2.90E+01	1.58E+03			1.27		
1200.00	1214.06	2.21E+00	4.62E+02	1.38E+01	3.54E+01	1.02E+02	2.54E+02	1.60E+01	8.54E+02			1.18		

Table 91. Henre source prompt free-field tissue vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		UNCOLLIDED	TOTAL	
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL
100.00	209.64	6.41E+06	4.72E+07	1.45E+05	2.76E+05	4.68E+06	6.56E+06	5.22E+07
200.00	271.93	2.38E+06	2.44E+07	6.61E+04	1.41E+05	2.76E+06	2.44E+06	2.73E+07
300.00	352.06	7.73E+05	1.06E+07	2.83E+04	6.18E+04	1.29E+06	8.01E+05	1.20E+07
400.00	440.40	2.54E+05	4.86E+06	1.28E+04	2.93E+04	6.80E+05	2.66E+05	5.57E+06
500.00	532.87	8.63E+04	2.27E+06	6.17E+03	1.42E+04	3.76E+05	9.25E+04	2.66E+06
600.00	627.65	3.06E+04	1.12E+06	3.15E+03	7.32E+03	2.17E+05	3.37E+04	1.34E+06
700.00	723.84	1.12E+04	5.77E+05	1.69E+03	4.03E+03	1.27E+05	1.29E+04	7.09E+05
800.00	820.94	4.23E+03	3.09E+05	9.40E+02	2.35E+03	7.58E+04	5.17E+03	3.87E+05
900.00	918.67	1.64E+03	1.70E+05	5.42E+02	1.42E+03	4.59E+04	2.18E+03	2.17E+05
1000.00	1016.83	6.48E+02	9.52E+04	3.21E+02	8.75E+02	2.82E+04	9.69E+02	1.24E+05
1100.00	1115.32	2.62E+02	5.44E+04	1.94E+02	5.47E+02	1.75E+04	4.56E+02	7.25E+04
1200.00	1214.06	1.07E+02	3.14E+04	1.20E+02	3.44E+02	1.10E+04	2.27E+02	4.27E+04

Table 92. Delayed free-field tissue dose vs. range for a 30.0 KT
weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
		GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL		
100.00	209.64	1.70E+02	8.72E+02	7.13E+03	1.04E+04	2.19E+01	7.30E+03	1.13E+04	0.08			
200.00	271.93	6.68E+01	5.67E+02	3.66E+03	6.35E+03	2.45E+01	3.73E+03	6.95E+03	0.09			
300.00	352.06	2.26E+01	3.29E+02	1.82E+03	3.69E+03	2.09E+01	1.84E+03	4.04E+03	0.09			
400.00	440.40	6.83E+00	1.75E+02	8.45E+02	2.00E+03	1.60E+01	8.52E+02	2.19E+03	0.09			
500.00	532.87	1.67E+00	8.70E+01	3.72E+02	1.03E+03	1.12E+01	3.73E+02	1.13E+03	0.08			
600.00	627.65	3.97E-01	4.19E+01	1.70E+02	5.29E+02	7.17E+00	1.70E+02	5.78E+02	0.08			
700.00	723.84	9.07E-02	1.89E+01	7.85E+01	2.61E+02	4.10E+00	7.85E+01	2.85E+02	0.07			
800.00	820.94	2.52E-02	9.50E+00	4.02E+01	1.42E+02	2.53E+00	4.02E+01	1.54E+02	0.07			
900.00	918.67	7.00E-03	4.50E+00	2.11E+01	7.62E+01	1.50E+00	2.11E+01	8.22E+01	0.06			
1000.00	1016.83	2.22E-03	2.30E+00	1.18E+01	4.37E+01	9.37E-01	1.18E+01	4.69E+01	0.05			
1100.00	1113.32	6.20E-04	1.07E+00	6.52E+00	2.44E+01	5.74E-01	6.52E+00	2.60E+01	0.04			
1200.00	1214.06	1.98E-04	5.33E-01	3.78E+00	1.43E+01	3.67E-01	3.78E+00	1.52E+01	0.04			

Table 93. Henre source prompt plus delayed free-field tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
		GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL		
100.00	209.64	6.41E+06	4.72E+07	1.52E+05	2.86E+05	4.68E+06	6.57E+06	5.22E+07	9.50			
200.00	271.93	2.38E+06	2.44E+07	6.97E+04	1.47E+05	2.76E+06	2.45E+06	2.73E+07	8.39			
300.00	352.96	7.73E+05	1.06E+07	3.02E+04	6.55E+04	1.29E+06	8.03E+05	1.20E+07	7.82			
400.00	440.40	2.54E+05	4.86E+06	1.36E+04	3.13E+04	6.80E+05	2.67E+05	5.57E+06	6.84			
500.00	532.87	8.64E+04	2.27E+06	6.54E+03	1.53E+04	3.76E+05	9.29E+04	2.66E+06	5.81			
600.00	627.65	3.06E+04	1.12E+06	3.32E+03	7.84E+03	2.17E+05	3.39E+04	1.34E+06	4.97			
700.00	723.84	1.12E+04	5.77E+05	1.77E+03	4.29E+03	1.27E+05	1.30E+04	7.09E+05	4.39			
800.00	820.94	4.23E+03	3.09E+05	9.81E+02	2.49E+03	7.58E+04	5.21E+03	3.88E+05	3.95			
900.00	918.67	1.64E+03	1.70E+05	5.63E+02	1.49E+03	4.59E+04	2.20E+03	2.17E+05	3.58			
1000.00	1016.83	6.48E+02	9.52E+04	3.32E+02	9.18E+02	2.62E+04	9.81E+02	1.24E+05	3.27			
1100.00	1115.32	2.62E+02	5.44E+04	2.01E+02	5.71E+02	1.75E+04	4.62E+02	7.25E+04	3.01			
1200.00	1214.66	1.07E+02	3.14E+04	1.24E+02	3.58E+02	1.10E+04	2.31E+02	4.27E+04	2.77			

Table 94. Henre source prompt armor shielded tissue dose vs. range
for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA			
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	209.64	4.33E+06	3.81E+07	3.76E+04	5.00E+04	1.16E+06	3.18E+06	4.37E+06	4.25E+07	8.68		
200.00	271.93	1.60E+06	1.97E+07	1.75E+04	2.48E+04	6.73E+05	1.93E+06	1.62E+06	2.23E+07	7.51		
300.00	352.06	5.22E+05	8.51E+06	7.71E+03	1.14E+04	3.14E+05	7.91E+05	5.29E+05	9.62E+06	7.61		
400.00	440.40	1.71E+05	3.78E+06	3.56E+03	5.62E+03	1.65E+05	3.88E+05	1.75E+05	4.34E+06	6.76		
500.00	532.87	5.83E+04	1.69E+06	1.75E+03	2.84E+03	9.12E+04	2.12E+05	6.00E+04	2.00E+06	5.53		
600.00	627.65	2.06E+04	7.86E+05	9.04E+02	1.51E+03	5.27E+04	1.23E+05	2.15E+04	9.64E+05	4.44		
700.00	723.84	7.56E+03	3.80E+05	4.90E+02	8.58E+02	3.10E+04	6.78E+04	8.05E+03	4.80E+05	3.82		
800.00	820.94	2.05E+03	1.90E+05	2.76E+02	5.13E+02	1.85E+04	3.70E+04	3.13E+03	2.46E+05	3.40		
900.00	918.67	1.11E+03	9.78E+04	1.60E+02	3.17E+02	1.13E+04	2.01E+04	1.26E+03	1.29E+05	3.09		
1000.00	1016.83	4.37E+02	5.15E+04	9.51E+01	2.00E+02	6.94E+03	1.13E+04	5.33E+02	6.99E+04	2.80		
1100.00	1115.32	1.76E+02	2.78E+04	5.79E+01	1.28E+02	4.33E+03	6.37E+03	2.34E+02	3.86E+04	2.57		
1200.00	1214.06	7.24E+01	1.52E+04	3.59E+01	8.16E+01	2.72E+03	3.63E+03	1.03E+02	2.16E+04	2.36		

Table 95. Delayed armor shielded tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		UNCOLLIDED	TOTAL	
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR			
100.00	209.64	1.53E+02	7.20E+02	1.19E+03	1.35E+03	5.63E+00	1.91E+02	1.35E+03	2.27E+03	0.46
200.00	271.93	5.97E+01	4.60E+02	6.44E+02	7.87E+02	6.24E+00	1.21E+02	7.04E+02	1.37E+03	0.50
300.00	352.06	2.01E+01	2.49E+02	3.38E+02	4.46E+02	5.32E+00	6.56E+01	3.58E+02	7.65E+02	0.48
400.00	440.40	6.09E+00	1.21E+02	1.67E+02	2.40E+02	4.05E+00	3.21E+01	1.73E+02	3.97E+02	0.44
500.00	532.87	1.47E+00	5.32E+01	7.88E+01	1.25E+02	2.82E+00	1.42E+01	8.02E+01	1.95E+02	0.38
600.00	627.65	3.47E-01	2.27E+01	3.82E+01	6.59E+01	1.80E+00	6.10E+00	3.86E+01	9.65E+01	0.31
700.00	723.84	7.90E-02	9.45E+00	1.85E+01	3.42E+01	1.63E+00	2.45E+00	1.85E+01	4.71E+01	0.25
800.00	820.94	2.20E-02	4.42E+00	9.83E+00	1.94E+01	6.31E-01	1.11E+00	9.85E+00	2.55E+01	0.21
900.00	918.67	6.08E-03	2.05E+00	5.29E+00	1.09E+01	3.73E-01	5.00E-01	5.29E+00	1.38E+01	0.17
1000.00	1016.83	1.93E-03	1.03E+00	3.03E+00	6.48E+00	2.34E-01	2.45E-01	3.04E+00	7.99E+00	0.15
1100.00	1115.32	5.45E-04	4.94E-01	1.70E+00	3.76E+00	1.43E-01	1.13E-01	1.70E+00	4.51E+00	0.12
1200.00	1214.06	1.72E-04	2.53E-01	1.00E+00	2.28E+00	9.20E-02	5.59E-02	1.00E+00	2.68E+00	0.10

Table 96. Henre source prompt plus delayed armor shielded tissue dose vs. range for a 30.0 KT weapon burst 186.00 meters above ground.

RANGE (METERS)		NEUTRON			TISSUE DOSE (RADS)			SECONDARY GAMMA			NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL				
100.00	209.64	4.33E+06	3.81E+07	3.88E+04	5.13E+04	1.16E+06	3.18E+06	4.37E+06	4.25E+07	8.68			
200.00	271.93	1.60E+06	1.97E+07	1.82E+04	2.55E+04	6.73E+05	1.93E+06	1.62E+06	2.24E+07	7.51			
300.00	352.06	5.22E+05	8.51E+06	8.05E+03	1.19E+04	3.14E+05	7.91E+05	5.30E+05	9.62E+06	7.61			
400.00	440.40	1.71E+05	3.78E+06	3.73E+03	5.86E+03	1.65E+05	3.88E+05	1.75E+05	4.34E+06	6.76			
500.00	532.87	5.83E+04	1.70E+06	1.83E+03	2.97E+03	9.12E+04	2.12E+05	6.01E+04	2.00E+06	5.53			
600.00	627.65	2.06E+04	7.86E+05	9.43E+02	1.53E+03	5.27E+04	1.23E+05	2.16E+04	9.64E+05	4.44			
700.00	723.84	7.56E+03	3.80E+05	5.09E+02	8.92E+02	3.10E+04	6.78E+04	8.07E+03	4.80E+05	3.82			
800.00	820.94	2.85E+03	1.90E+05	2.85E+02	5.32E+02	1.85E+04	3.70E+04	3.14E+03	2.46E+05	3.39			
900.00	918.67	1.11E+03	9.78E+04	1.65E+02	3.28E+02	1.13E+04	2.01E+04	1.27E+03	1.30E+05	3.09			
1000.00	1016.83	4.37E+02	5.15E+04	9.82E+01	2.07E+02	6.94E+03	1.13E+04	5.36E+02	6.99E+04	2.80			
1100.00	1115.32	1.76E+02	2.78E+04	5.96E+01	1.31E+02	4.33E+03	6.37E+03	2.36E+02	3.86E+04	2.57			
1200.00	1214.06	7.24E+01	1.52E+04	3.69E+01	8.39E+01	2.73E+03	3.63E+03	1.09E+02	2.16E+04	2.36			

Table 97. EM-1 fission source prompt free-field tissue dose vs.
100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL				
100.00	293.79	1.09E+05	3.37E+06	1.69E+04	5.69E+04			2.59E+05	1.26E+05	3.68E+06	10.67	
200.00	341.05	5.47E+04	2.06E+06	9.62E+03	3.48E+04			1.76E+05	6.44E+04	2.27E+06	9.80	
300.00	407.82	2.23E+04	1.12E+06	4.70E+03	1.90E+04			1.04E+05	2.70E+04	1.24E+06	9.09	
400.00	436.12	8.50E+03	5.31E+05	2.21E+03	8.69E+03			5.75E+04	1.07E+04	5.97E+05	8.02	
500.00	571.24	3.22E+03	2.46E+05	1.05E+03	4.19E+03			3.15E+04	4.27E+03	2.82E+05	6.90	
600.00	660.54	1.24E+03	1.21E+05	5.16E+02	2.09E+03			1.74E+04	1.75E+03	1.40E+05	6.19	
700.00	752.54	4.88E+02	6.07E+04	2.62E+02	1.04E+03			9.76E+03	7.50E+02	7.15E+04	5.62	
800.00	846.35	1.97E+02	3.20E+04	1.37E+02	5.25E+02			5.58E+03	3.35E+02	3.81E+04	5.25	
900.00	941.44	8.18E+01	1.84E+04	7.41E+01	2.80E+02			3.26E+03	1.56E+02	2.19E+04	5.21	
1000.00	1037.46	3.46E+01	1.09E+04	4.11E+01	1.57E+02			1.94E+03	7.57E+01	1.30E+04	5.20	
1100.00	1134.16	1.49E+01	6.30E+03	2.33E+01	9.15E+01			1.18E+03	3.83E+01	7.57E+03	4.96	
1200.00	1231.39	6.54E+00	3.50E+03	1.35E+01	5.45E+01			7.27E+02	2.01E+01	4.28E+03	4.47	

Table 98. Delayed free-field tissue dose vs. range for a 100.0 KT
weapon burst 278.00 meters above ground.

RANGE (METERS)		NEUTRON				TISSUE DOSE (RADS)				NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	GAMMA		SECONDARY GAMMA		
						UNCOLLIDED	TOTAL	AIR-GROUND	NEUTRON PLUS GAMMA UNCOLLIDED TOTAL	
100.00	293.79	5.28E+03	2.25E+04	2.06E+05	2.74E+05	2.06E+05	2.74E+05	5.09E+02	2.11E+05 2.97E+05	0.08
200.00	341.05	3.38E+03	1.70E+04	1.43E+05	2.04E+05	1.43E+05	2.04E+05	5.15E+02	1.47E+05 2.21E+05	0.08
300.00	407.82	1.83E+03	1.15E+04	8.85E+04	1.37E+05	8.85E+04	1.37E+05	4.83E+02	9.03E+04 1.49E+05	0.08
400.00	486.12	8.02E+02	7.28E+03	4.82E+04	8.54E+04	4.82E+04	8.54E+04	4.22E+02	4.90E+04 9.31E+04	0.08
500.00	571.24	2.13E+02	4.07E+03	2.18E+04	4.70E+04	2.18E+04	4.70E+04	3.55E+02	2.20E+04 5.14E+04	0.09
600.00	660.54	4.12E+01	1.94E+03	8.94E+03	2.33E+04	8.94E+03	2.33E+04	2.56E+02	8.98E+03 2.55E+04	0.08
700.00	752.54	8.22E+00	8.49E+02	3.84E+03	1.10E+04	3.84E+03	1.10E+04	1.50E+02	3.84E+03 1.20E+04	0.08
800.00	846.35	2.04E+00	4.15E+02	1.84E+03	5.72E+03	1.84E+03	5.72E+03	9.41E+01	1.85E+03 6.23E+03	0.07
900.00	941.44	5.36E-01	1.93E+02	9.27E+02	2.96E+03	9.27E+02	2.96E+03	5.49E+01	9.27E+02 3.20E+03	0.06
1000.00	1037.46	1.62E-01	9.71E+01	5.01E+02	1.64E+03	5.01E+02	1.64E+03	3.39E+01	5.01E+02 1.77E+03	0.06
1100.00	1134.16	4.76E-02	4.59E+01	2.73E+02	9.02E+02	2.73E+02	9.02E+02	2.06E+01	2.73E+02 9.68E+02	0.05
1200.00	1231.39	1.55E-02	2.31E+01	1.57E+02	5.23E+02	1.57E+02	5.23E+02	1.31E+01	1.57E+02 5.59E+02	0.04

Table 99. EM-1 fission source prompt plus delayed free-field tissue dose vs. range for a 100.0 KT weapon burst 278.00 meters above ground.

TISSUE DOSE (RADS)													
RANGE (METERS)		NEUTRON			GAMMA			SECONDARY GAMMA			NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL			
100.00	293.79	1.14E+05	3.39E+06	2.23E+05	3.31E+05	2.59E+05	3.98E+06	2.59E+05	3.37E+05	3.98E+06	5.75		
200.00	341.05	5.81E+04	2.08E+06	1.53E+05	2.39E+05	1.76E+05	2.49E+06	1.76E+05	2.11E+05	2.49E+06	5.01		
300.00	407.82	2.42E+04	1.13E+06	9.32E+04	1.56E+05	1.05E+05	1.39E+06	1.05E+05	1.17E+05	1.39E+06	4.34		
400.00	486.12	9.30E+03	5.38E+05	5.04E+04	9.40E+04	5.79E+04	6.90E+05	5.79E+04	5.97E+04	6.90E+05	3.54		
500.00	571.24	3.43E+03	2.51E+05	2.28E+04	5.12E+04	3.19E+04	3.34E+05	3.19E+04	2.63E+04	3.34E+05	3.02		
600.00	660.54	1.28E+03	1.23E+05	9.46E+03	2.54E+04	1.77E+04	1.66E+05	1.77E+04	1.07E+04	1.66E+05	2.85		
700.00	752.54	4.96E+02	6.15E+04	4.10E+03	1.20E+04	9.91E+03	8.35E+04	9.91E+03	4.59E+03	8.35E+04	2.81		
800.00	846.35	2.00E+02	3.24E+04	1.98E+03	6.25E+03	5.67E+03	4.44E+04	5.67E+03	2.18E+03	4.44E+04	2.72		
900.00	941.44	8.23E+01	1.86E+04	1.00E+03	3.24E+03	3.31E+03	2.51E+04	3.31E+03	1.08E+03	2.51E+04	2.84		
1000.00	1037.46	3.48E+01	1.10E+04	5.42E+02	1.79E+03	1.97E+03	1.48E+04	1.97E+03	5.77E+02	1.48E+04	2.92		
1100.00	1134.16	1.50E+01	6.34E+03	2.97E+02	9.93E+02	1.20E+03	8.54E+03	1.20E+03	3.12E+02	8.54E+03	2.89		
1200.00	1231.39	6.55E+00	3.52E+03	1.71E+02	5.78E+02	7.40E+02	4.84E+03	7.40E+02	1.77E+02	4.84E+03	2.67		

Table 100. EM-1 fission source prompt armor shielded tissue dose vs. range for a 100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		NEUTRON				GAMMA				SECONDARY GAMMA				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL			
100.00	293.79	8.95E+04	2.53E+06	3.61E+03	5.93E+03	6.48E+04	7.88E+05	8.41E+04	3.38E+06					2.94		
200.00	341.05	4.02E+04	1.49E+06	2.12E+03	3.66E+03	4.39E+04	4.84E+05	4.23E+04	2.03E+06					2.81		
300.00	407.82	1.63E+04	7.51E+05	1.08E+03	2.05E+03	2.61E+04	2.54E+05	1.73E+04	1.03E+06					2.66		
400.00	486.12	6.15E+03	3.33E+05	5.27E+02	1.02E+03	1.43E+04	1.17E+05	6.68E+03	4.65E+05					2.51		
500.00	571.24	2.31E+03	1.47E+05	2.60E+02	5.32E+02	7.82E+03	5.55E+04	2.57E+03	2.11E+05					2.30		
600.00	660.54	8.86E+02	6.70E+04	1.31E+02	2.85E+02	4.32E+03	2.72E+04	1.02E+03	9.88E+04					2.11		
700.00	752.54	3.48E+02	3.16E+04	6.85E+01	1.51E+02	2.42E+03	1.37E+04	4.16E+02	4.79E+04					1.94		
800.00	846.35	1.40E+02	1.56E+04	3.67E+01	8.10E+01	1.38E+03	7.33E+03	1.77E+02	2.44E+04					1.77		
900.00	941.44	5.80E+01	8.23E+03	2.02E+01	4.53E+01	8.09E+02	4.24E+03	7.82E+01	1.33E+04					1.62		
1000.00	1037.46	2.45E+01	4.54E+03	1.14E+01	2.66E+01	4.83E+02	2.58E+03	3.59E+01	7.62E+03					1.47		
1100.00	1134.16	1.06E+01	2.50E+03	6.54E+00	1.61E+01	2.94E+02	1.55E+03	1.71E+01	4.36E+03					1.34		
1200.00	1231.39	4.62E+00	1.36E+03	3.83E+00	9.96E+00	1.82E+02	9.09E+02	8.45E+00	2.46E+03					1.23		

Table 101. Delayed armor shielded tissue dose vs. range for a
100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON			GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	293.79	4.75E+03	1.88E+04	3.37E+04	3.66E+04	1.31E+02	5.17E+03	3.85E+04	6.08E+04	0.45		
200.00	341.05	3.03E+03	1.40E+04	2.39E+04	2.68E+04	1.32E+02	3.74E+03	2.69E+04	4.46E+04	0.46		
300.00	407.82	1.64E+03	9.29E+03	1.51E+04	1.77E+04	1.23E+02	2.46E+03	1.68E+04	2.96E+04	0.46		
400.00	486.12	7.17E+02	5.75E+03	8.60E+03	1.07E+04	1.07E+02	1.51E+03	9.31E+03	1.81E+04	0.47		
500.00	571.24	1.89E+02	2.95E+03	4.22E+03	5.75E+03	8.97E+01	7.69E+02	4.41E+03	9.56E+03	0.45		
600.00	660.54	3.62E+01	1.20E+03	1.90E+03	2.87E+03	6.43E+01	3.22E+02	1.93E+03	4.45E+03	0.37		
700.00	752.54	7.19E+00	4.68E+02	8.63E+02	1.41E+03	3.75E+01	1.25E+02	8.71E+02	2.04E+03	0.30		
800.00	846.35	1.77E+00	2.07E+02	4.37E+02	7.65E+02	2.35E+01	5.51E+01	4.39E+02	1.05E+03	0.25		
900.00	941.44	4.66E-01	9.24E+01	2.27E+02	4.14E+02	1.37E+01	2.38E+01	2.27E+02	5.44E+02	0.20		
1000.00	1037.46	1.41E-01	4.49E+01	1.26E+02	2.39E+02	8.42E+00	1.13E+01	1.26E+02	3.03E+02	0.17		
1100.00	1134.16	4.13E-02	2.15E+01	7.01E+01	1.37E+02	5.13E+00	5.35E+00	7.62E+01	1.69E+02	0.15		
1200.00	1231.39	1.35E-02	1.10E+01	4.11E+01	8.24E+01	3.27E+00	2.71E+00	4.11E+01	9.94E+01	0.12		

Table 102. EM-1 fission source prompt plus delayed armor shielded tissue dose vs. range for a 100.0 Kt weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		TOTAL		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	293.79	8.52E+04	2.55E+06	3.73E+04	4.26E+04	6.56E+04	7.93E+05	1.23E+05	3.45E+06		2.83	
200.00	341.05	4.32E+04	1.51E+06	2.60E+04	3.04E+04	4.40E+04	4.87E+05	6.92E+04	2.97E+06		2.68	
300.00	407.82	1.79E+04	7.60E+05	1.62E+04	1.97E+04	2.62E+04	2.56E+05	3.41E+04	1.06E+06		2.51	
400.00	486.12	6.87E+03	3.38E+05	9.12E+03	1.17E+04	1.44E+04	1.19E+05	1.60E+04	4.83E+05		2.33	
500.00	571.24	2.50E+03	1.50E+05	4.46E+03	6.28E+03	7.91E+03	5.63E+04	6.98E+03	2.20E+05		2.13	
600.00	660.54	9.22E+02	6.82E+04	2.03E+03	3.15E+03	4.38E+03	2.75E+04	2.95E+03	1.03E+05		1.95	
700.00	752.54	3.55E+02	3.20E+04	9.32E+02	1.56E+03	2.46E+03	1.39E+04	1.29E+03	4.99E+04		1.79	
800.00	846.35	1.42E+02	1.58E+04	4.74E+02	8.46E+02	1.41E+03	7.38E+03	6.16E+02	2.54E+04		1.64	
900.00	941.44	5.85E+01	8.33E+03	2.47E+02	4.59E+02	8.23E+02	4.27E+03	3.05E+02	1.39E+04		1.50	
1000.00	1037.46	2.46E+01	4.58E+03	1.37E+02	2.65E+02	4.92E+02	2.59E+03	1.62E+02	7.92E+03		1.37	
1100.00	1134.16	1.06E+01	2.52E+03	7.67E+01	1.53E+02	2.99E+02	1.56E+03	8.73E+01	4.53E+03		1.25	
1200.00	1231.39	4.63E+00	1.37E+03	4.49E+01	9.23E+01	1.85E+02	9.12E+02	4.95E+01	2.56E+03		1.15	

Table 103. Low yield thermonuclear source prompt free-field tissue dose vs. range for a 100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON PLUS GAMMA UNCOLLIDED TOTAL	NEUTRON/ GAMMA RATIO
		NEUTRON		GAMMA		SECONDARY GAMMA			
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND			
100.00	293.79	1.51E+05	3.98E+06	9.82E+04	2.42E+05	5.27E+05	2.49E+05	4.74E+06	5.17
200.00	341.05	7.64E+04	2.44E+06	5.80E+04	1.53E+05	3.37E+05	1.34E+05	2.93E+06	4.98
300.00	407.82	3.15E+04	1.33E+06	2.95E+04	8.86E+04	1.88E+05	6.10E+04	1.61E+06	4.82
400.00	486.12	1.21E+04	6.35E+05	1.44E+04	4.35E+04	9.87E+04	2.65E+04	7.78E+05	4.47
500.00	571.24	4.61E+03	2.99E+05	7.09E+03	2.26E+04	5.31E+04	1.17E+04	3.74E+05	3.95
600.00	660.54	1.78E+03	1.47E+05	3.56E+03	1.20E+04	2.94E+04	5.34E+03	1.89E+05	3.56
700.00	752.54	7.01E+02	7.46E+04	1.83E+03	6.28E+03	1.67E+04	2.53E+03	9.76E+04	3.25
800.00	846.35	2.83E+02	3.96E+04	9.68E+02	3.30E+03	9.77E+03	1.25E+03	5.27E+04	3.03
900.00	941.44	1.17E+02	2.28E+04	5.24E+02	1.81E+03	5.86E+03	6.41E+02	3.05E+04	2.97
1000.00	1037.46	4.90E+01	1.36E+04	2.90E+02	1.05E+03	3.60E+03	3.39E+02	1.82E+04	2.93
1100.00	1134.16	2.10E+01	7.94E+03	1.64E+02	6.21E+02	2.25E+03	1.85E+02	1.08E+04	2.77
1200.00	1231.39	9.10E+00	4.49E+03	9.39E+01	3.75E+02	1.42E+03	1.03E+02	6.23E+03	2.50

Table 104. Delayed free-field tissue dose vs. range for a 100.0
KT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO	
		NEUTRON			GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
		UNCOLLIDED	TOTAL		UNCOLLIDED	TOTAL	AIR-GROUND		UNCOLLIDED	TOTAL			
GROUND	SLANT												
100.00	293.79	2.64E+03	1.13E+04		1.03E+05	1.37E+05		2.55E+02			1.06E+05	1.48E+05	0.08
200.00	341.05	1.69E+03	8.48E+03		7.17E+04	1.02E+05		2.58E+02			7.34E+04	1.11E+05	0.08
300.00	407.82	9.16E+02	5.73E+03		4.42E+04	6.87E+04		2.41E+02			4.52E+04	7.46E+04	0.08
400.00	486.12	4.01E+02	3.64E+03		2.41E+04	4.27E+04		2.11E+02			2.45E+04	4.65E+04	0.08
500.00	571.24	1.07E+02	2.03E+03		1.09E+04	2.35E+04		1.78E+02			1.10E+04	2.57E+04	0.09
600.00	660.54	2.06E+01	9.71E+02		4.47E+03	1.17E+04		1.28E+02			4.49E+03	1.28E+04	0.08
700.00	752.54	4.11E+00	4.24E+02		1.92E+03	5.49E+03		7.40E+01			1.92E+03	5.99E+03	0.03
800.00	846.35	1.02E+00	2.07E+02		9.22E+02	2.86E+03		4.70E+01			9.23E+02	3.12E+03	0.07
900.00	941.44	2.68E-01	9.63E+01		4.63E+02	1.40E+03		2.74E+01			4.64E+02	1.60E+03	0.06
1000.00	1037.46	8.12E-02	4.85E+01		2.51E+02	8.18E+02		1.69E+01			2.51E+02	8.84E+02	0.06
1100.00	1134.16	2.38E-02	2.29E+01		1.37E+02	4.51E+02		1.03E+01			1.37E+02	4.84E+02	0.05
1200.00	1231.39	7.76E-03	1.16E+01		7.85E+01	2.62E+02		6.55E+00			7.85E+01	2.80E+02	0.04

Table 105. Low yield thermonuclear source prompt plus delayed free-field tissue dose vs. range for a 100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON/ GAMMA RATIO	
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA			
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	NEUTRON PLUS GAMMA UNCOLLIDED TOTAL		
100.00	293.79	1.53E+05	3.99E+06	2.01E+05	3.78E+05	5.28E+05	3.55E+05	4.89E+06	4.40
200.00	341.05	7.81E+04	2.45E+06	1.30E+05	2.55E+05	3.38E+05	2.08E+05	3.04E+06	4.14
300.00	407.82	3.24E+04	1.34E+06	7.38E+04	1.57E+05	1.88E+05	1.06E+05	1.68E+06	3.88
400.00	436.12	1.25E+04	6.39E+05	3.85E+04	8.62E+04	9.89E+04	5.10E+04	8.24E+05	3.45
500.00	571.24	4.72E+03	3.01E+05	1.80E+04	4.61E+04	5.32E+04	2.27E+04	4.00E+05	3.03
600.00	660.54	1.80E+03	1.48E+05	8.03E+03	2.37E+04	2.95E+04	9.83E+03	2.01E+05	2.79
700.00	752.54	7.05E+02	7.51E+04	3.75E+03	1.18E+04	1.68E+04	4.46E+03	1.04E+05	2.63
800.00	846.35	2.84E+02	3.99E+04	1.89E+03	6.17E+03	9.82E+03	2.17E+03	5.58E+04	2.49
900.00	941.44	1.17E+02	2.29E+04	9.87E+02	3.29E+03	5.89E+03	1.10E+03	3.21E+04	2.50
1000.00	1037.46	4.91E+01	1.36E+04	5.40E+02	1.86E+03	3.62E+03	5.90E+02	1.91E+04	2.49
1100.00	1134.16	2.10E+01	7.96E+03	3.00E+02	1.07E+03	2.26E+03	3.21E+02	1.13E+04	2.39
1200.00	1231.39	9.10E+00	4.50E+03	1.72E+02	6.37E+02	1.43E+03	1.82E+02	6.56E+03	2.18

Table 106. Low yield thermonuclear source prompt armor shielded
tissue dose vs. range for a 100.0 KT weapon burst
278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON / GAMMA RATIO	
		NEUTRON		GAMMA		SECONDARY GAMMA			
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	NEUTRON PLUS GAMMA UNCOLLIDED	TOTAL
100.00	293.79	1.09E+05	3.01E+06	2.43E+04	3.77E+04	1.33E+05	1.23E+06	1.34E+05	4.41E+06
200.00	341.05	5.50E+04	1.80E+06	1.45E+04	2.35E+04	8.44E+04	7.34E+05	6.96E+04	2.64E+06
300.00	407.82	2.25E+04	9.14E+05	7.52E+03	1.34E+04	4.69E+04	3.77E+05	3.00E+04	1.35E+06
400.00	486.12	8.60E+03	4.10E+05	3.73E+03	6.84E+03	2.46E+04	1.70E+05	1.23E+04	6.11E+05
500.00	571.24	3.26E+03	1.85E+05	1.86E+03	3.65E+03	1.32E+04	7.70E+04	5.12E+03	2.78E+05
600.00	660.54	1.25E+03	8.52E+04	9.48E+02	1.99E+03	7.28E+03	3.44E+04	2.20E+03	1.29E+05
700.00	752.54	4.92E+02	4.06E+04	4.94E+02	1.07E+03	4.15E+03	1.72E+04	9.87E+02	6.30E+04
800.00	846.35	1.98E+02	2.02E+04	2.64E+02	5.76E+02	2.43E+03	9.10E+03	4.62E+02	3.23E+04
900.00	941.44	8.15E+01	1.07E+04	1.44E+02	3.22E+02	1.46E+03	5.27E+03	2.26E+02	1.77E+04
1000.00	1037.46	3.42E+01	5.89E+03	8.07E+01	1.89E+02	8.98E+02	3.16E+03	1.15E+02	1.01E+04
1100.00	1134.16	1.46E+01	3.27E+03	4.59E+01	1.14E+02	5.62E+02	1.87E+03	6.05E+01	5.81E+03
1200.00	1231.39	6.36E+00	1.80E+03	2.65E+01	7.02E+01	3.57E+02	1.07E+03	3.29E+01	3.29E+03

Table 107. Delayed armor shielded tissue dose vs. range for a
100.0 KT weapon burst 278.00 meters above ground.

TISSUE DOSE (RADS)												
RANGE (METERS)		NEUTRON		GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO	
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	293.79	2.37E+03	9.42E+03	1.69E+04	1.83E+04	6.57E+01	2.58E+03	1.92E+04	3.04E+04	0.45		
200.00	341.05	1.52E+03	6.99E+03	1.19E+04	1.34E+04	6.60E+01	1.87E+03	1.35E+04	2.23E+04	0.46		
300.00	407.82	8.22E+02	4.65E+03	7.56E+03	8.84E+03	6.15E+01	1.23E+03	8.38E+03	1.48E+04	0.46		
400.00	486.12	3.59E+02	2.87E+03	4.30E+03	5.35E+03	5.36E+01	7.55E+02	4.66E+03	9.03E+03	0.47		
500.00	571.24	9.45E+01	1.47E+03	2.11E+03	2.88E+03	4.49E+01	3.84E+02	2.20E+03	4.78E+03	0.45		
600.00	660.54	1.81E+01	5.99E+02	9.48E+02	1.43E+03	3.22E+01	1.61E+02	9.66E+02	2.23E+03	0.37		
700.00	752.54	3.59E+00	2.34E+02	4.32E+02	7.06E+02	1.87E+01	6.25E+01	4.35E+02	1.02E+03	0.30		
800.00	846.35	8.06E-01	1.04E+02	2.18E+02	3.82E+02	1.17E+01	2.75E+01	2.19E+02	5.25E+02	0.25		
900.00	941.44	2.33E-01	4.62E+01	1.13E+02	2.07E+02	6.83E+00	1.19E+01	1.14E+02	2.72E+02	0.20		
1000.00	1037.46	7.05E-02	2.24E+01	6.30E+01	1.19E+02	4.21E+00	5.63E+00	6.31E+01	1.52E+02	0.17		
1100.00	1134.16	2.07E-02	1.06E+01	3.51E+01	6.85E+01	2.57E+00	2.68E+00	3.51E+01	8.45E+01	0.15		
1200.00	1231.39	6.73E-03	5.51E+00	2.05E+01	4.12E+01	1.63E+00	1.36E+00	2.05E+01	4.97E+01	0.12		

Table 108. Low yield thermonuclear source prompt plus delayed armor shielded tissue dose vs. range for a 100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		NEUTRON		TISSUE DOSE (RADS)				NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
		UNCOLLIDED	TOTAL	GAMMA		SECONDARY GAMMA		UNCOLLIDED	TOTAL	
GROUND	SLANT			UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR			
100.00	293.79	1.12E+05	3.02E+06	4.12E+04	5.60E+04	1.33E+05	1.23E+06	1.53E+05	4.44E+06	2.13
200.00	341.05	5.65E+04	1.80E+06	2.65E+04	3.69E+04	8.45E+04	7.36E+05	8.30E+04	2.66E+06	2.10
300.00	407.82	2.33E+04	9.19E+05	1.51E+04	2.23E+04	4.70E+04	3.78E+05	3.84E+04	1.37E+06	2.05
400.00	486.12	8.96E+03	4.13E+05	8.03E+03	1.22E+04	2.46E+04	1.70E+05	1.70E+04	6.20E+05	1.99
500.00	571.24	3.35E+03	1.86E+05	3.97E+03	6.53E+03	1.32E+04	7.74E+04	7.32E+03	2.83E+05	1.92
600.00	660.54	1.27E+03	8.58E+04	1.90E+03	3.42E+03	7.32E+03	3.46E+04	3.17E+03	1.31E+05	1.89
700.00	752.54	4.96E+02	4.08E+04	9.26E+02	1.77E+03	4.17E+03	1.73E+04	1.42E+03	6.40E+04	1.76
800.00	846.35	1.99E+02	2.03E+04	4.83E+02	9.58E+02	2.44E+03	9.13E+03	6.82E+02	3.28E+04	1.62
900.00	941.44	8.18E+01	1.07E+04	2.58E+02	5.29E+02	1.47E+03	5.28E+03	3.40E+02	1.80E+04	1.47
1000.00	1037.46	3.43E+01	5.91E+03	1.44E+02	3.08E+02	9.02E+02	3.17E+03	1.78E+02	1.03E+04	1.35
1100.00	1134.16	1.47E+01	3.28E+03	8.09E+01	1.82E+02	5.65E+02	1.87E+03	9.56E+01	5.90E+03	1.25
1200.00	1231.39	6.36E+00	1.80E+03	4.71E+01	1.11E+02	3.58E+02	1.07E+03	5.34E+01	3.34E+03	1.17

Table 109. Henre source prompt free-field tissue dose vs. range
for a 100.0 KT weapon burst 278.00 meters above
ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	NEUTRON PLUS GAMMA UNCOLLIDED TOTAL	
100.00	293.79	5.75E+06	6.79E+07	1.72E+05	3.73E+05	7.70E+06	5.92E+06 7.60E+07	8.42
200.00	341.05	2.99E+06	4.39E+07	1.05E+05	2.38E+05	5.32E+06	3.09E+06 4.95E+07	7.90
300.00	407.82	1.26E+06	2.48E+07	5.64E+04	1.39E+05	3.40E+06	1.32E+06 2.83E+07	7.01
400.00	486.12	4.91E+05	1.24E+07	2.94E+04	7.10E+04	1.89E+06	5.21E+05 1.44E+07	6.35
500.00	571.24	1.88E+05	6.37E+06	1.55E+04	3.86E+04	1.09E+06	2.03E+05 7.51E+06	5.62
600.00	660.54	7.20E+04	3.30E+06	8.43E+03	2.16E+04	6.53E+05	8.04E+04 3.97E+06	4.89
700.00	752.54	2.79E+04	1.74E+06	4.71E+03	1.20E+04	3.92E+05	3.26E+04 2.14E+06	4.30
800.00	846.35	1.10E+04	9.46E+05	2.71E+03	6.72E+03	2.40E+05	1.37E+04 1.19E+06	3.84
900.00	941.44	4.39E+03	5.40E+05	1.59E+03	3.93E+03	1.49E+05	5.99E+03 6.93E+05	3.52
1000.00	1037.46	1.78E+03	3.21E+05	9.60E+02	2.41E+03	9.41E+04	2.74E+03 4.17E+05	3.32
1100.00	1134.16	7.35E+02	1.95E+05	5.89E+02	1.54E+03	5.98E+04	1.32E+03 2.56E+05	3.17
1200.00	1231.39	3.06E+02	1.18E+05	3.68E+02	1.01E+03	3.81E+04	6.74E+02 1.57E+05	3.01

Table 110. Delayed free-field tissue dose vs. range for a
100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL		
100.00	293.79	5.28E+02	2.25E+03	2.06E+04	2.74E+04	5.09E+01	2.11E+04	2.97E+04	0.08	
200.00	341.05	3.38E+02	1.70E+03	1.43E+04	2.04E+04	5.15E+01	1.47E+04	2.21E+04	0.08	
300.00	407.82	1.83E+02	1.15E+03	8.85E+03	1.37E+04	4.83E+01	9.03E+03	1.49E+04	0.08	
400.00	486.12	8.02E+01	7.28E+02	4.82E+03	8.54E+03	4.22E+01	4.90E+03	9.31E+03	0.08	
500.00	571.24	2.13E+01	4.07E+02	2.18E+03	4.70E+03	3.55E+01	2.20E+03	5.14E+03	0.09	
600.00	660.54	4.12E+00	1.94E+02	8.94E+02	2.33E+03	2.56E+01	8.98E+02	2.55E+03	0.08	
700.00	752.54	8.22E-01	8.49E+01	3.84E+02	1.10E+03	1.50E+01	3.84E+02	1.20E+03	0.08	
800.00	846.35	2.04E-01	4.15E+01	1.84E+02	5.72E+02	9.41E+00	1.85E+02	6.23E+02	0.07	
900.00	941.44	5.36E-02	1.93E+01	9.27E+01	2.96E+02	5.49E+00	9.27E+01	3.20E+02	0.06	
1000.00	1037.46	1.62E-02	9.71E+00	5.01E+01	1.64E+02	3.39E+00	5.01E+01	1.77E+02	0.06	
1100.00	1134.16	4.76E-03	4.59E+00	2.73E+01	9.02E+01	2.06E+00	2.73E+01	9.68E+01	0.05	
1200.00	1231.39	1.55E-03	2.31E+00	1.57E+01	5.23E+01	1.31E+00	1.57E+01	5.59E+01	0.04	

Table 111. Henre source prompt plus delayed free-field tissue dose vs. range for a 100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEU. GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA				
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	UNCOLLIDED	TOTAL				
100.00	293.79	5.75E+06	6.79E+07	1.93E+05	4.00E+05	7.70E+06	5.94E+06	7.60E+07	8.39			
200.00	341.05	2.99E+06	4.39E+07	1.20E+05	2.59E+05	5.33E+06	3.11E+06	4.95E+07	7.87			
300.00	407.82	1.26E+06	2.48E+07	6.53E+04	1.53E+05	3.40E+06	1.33E+06	2.83E+07	6.98			
400.00	486.12	4.92E+05	1.24E+07	3.42E+04	7.96E+04	1.89E+06	5.26E+05	1.44E+07	6.32			
500.00	571.24	1.88E+05	6.37E+06	1.77E+04	4.33E+04	1.09E+06	2.06E+05	7.51E+06	5.60			
600.00	660.54	7.20E+04	3.30E+06	9.32E+03	2.39E+04	6.53E+05	8.13E+04	3.98E+06	4.87			
700.00	752.54	2.79E+04	1.74E+06	5.09E+03	1.31E+04	3.92E+05	3.30E+04	2.14E+06	4.29			
800.00	846.35	1.10E+04	9.46E+05	2.89E+03	7.29E+03	2.40E+05	1.39E+04	1.19E+06	3.83			
900.00	941.44	4.39E+03	5.40E+05	1.69E+03	4.22E+03	1.49E+05	6.08E+03	6.94E+05	3.52			
1000.00	1037.46	1.78E+03	3.21E+05	1.01E+03	2.58E+03	9.41E+04	2.79E+03	4.18E+05	3.32			
1100.00	1134.16	7.35E+02	1.95E+05	6.17E+02	1.63E+03	5.98E+04	1.35E+03	2.56E+05	3.17			
1200.00	1231.39	3.06E+02	1.18E+05	3.84E+02	1.06E+03	3.81E+04	6.90E+02	1.57E+05	3.01			

Table 112. Henre source armor shielded tissue dose vs. range for a 100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		NEUTRON PLUS GAMMA		TOTAL		
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	293.79	3.88E+06	5.57E+07	4.60E+04	6.64E+04	1.88E+06	5.41E+06	3.93E+06	6.31E+07		7.58	
200.00	341.05	2.91E+06	3.58E+07	2.86E+04	4.22E+04	1.29E+06	3.30E+06	2.04E+06	4.04E+07		7.72	
300.00	407.82	8.50E+05	1.98E+07	1.56E+04	2.47E+04	8.19E+05	2.05E+06	8.66E+05	2.27E+07		6.83	
400.00	486.12	3.32E+05	9.62E+06	8.26E+03	1.34E+04	4.54E+05	1.13E+06	3.40E+05	1.12E+07		6.02	
500.00	571.24	1.27E+05	4.74E+06	4.43E+03	7.57E+03	2.64E+05	5.90E+05	1.31E+05	5.60E+06		5.50	
600.00	660.54	4.85E+04	2.33E+06	2.43E+03	4.39E+03	1.58E+05	3.44E+05	5.10E+04	2.84E+06		4.60	
700.00	752.54	1.88E+04	1.15E+06	1.37E+03	2.53E+03	9.52E+04	1.94E+05	2.02E+04	1.45E+06		3.96	
800.00	846.35	7.41E+03	5.85E+05	7.95E+02	1.46E+03	5.84E+04	1.12E+05	8.21E+03	7.57E+05		3.40	
900.00	941.44	2.96E+03	3.08E+05	4.71E+02	8.76E+02	3.65E+04	6.82E+04	3.44E+03	4.14E+05		2.92	
1000.00	1037.46	1.20E+03	1.69E+05	2.85E+02	5.48E+02	2.31E+04	4.02E+04	1.49E+03	2.33E+05		2.65	
1100.00	1134.16	4.96E+02	9.54E+04	1.76E+02	3.55E+02	1.47E+04	2.34E+04	6.71E+02	1.34E+05		2.48	
1200.00	1231.39	2.07E+02	5.44E+04	1.10E+02	2.35E+02	9.40E+03	1.36E+04	3.17E+02	7.76E+04		2.35	

Table 113. Delayed armor shielded tissue dose vs. range for a 100.0 kT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)						NEUTRON PLUS GAMMA		NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA		UNCOLLIDED	TOTAL	
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR			
100.00	293.79	4.75E+02	1.88E+03	3.37E+03	3.66E+03	1.31E+01	5.17E+02	3.85E+03	6.08E+03	0.45
200.00	341.05	3.03E+02	1.40E+03	2.39E+03	2.68E+03	1.32E+01	3.74E+02	2.69E+03	4.46E+03	0.46
300.00	407.82	1.64E+02	9.29E+02	1.51E+03	1.77E+03	1.23E+01	2.46E+02	1.68E+03	2.96E+03	0.46
400.00	486.12	7.17E+01	5.75E+02	8.60E+02	1.07E+03	1.07E+01	1.51E+02	9.31E+02	1.81E+03	0.47
500.00	571.24	1.89E+01	2.95E+02	4.22E+02	5.75E+02	8.97E+00	7.69E+01	4.41E+02	9.56E+02	0.45
600.00	660.54	3.62E+00	1.20E+02	1.90E+02	2.87E+02	6.43E+00	3.22E+01	1.93E+02	4.45E+02	0.37
700.00	752.54	7.19E-01	4.68E+01	8.63E+01	1.41E+02	3.75E+00	1.25E+01	8.71E+01	2.04E+02	0.30
800.00	846.35	1.77E-01	2.07E+01	4.37E+01	7.65E+01	2.35E+00	5.51E+00	4.39E+01	1.05E+02	0.25
900.00	941.44	4.66E-02	9.24E+00	2.27E+01	4.14E+01	1.37E+00	2.38E+00	2.27E+01	5.44E+01	0.20
1000.00	1037.46	1.41E-02	4.49E+00	1.26E+01	2.39E+01	8.42E-01	1.13E+00	1.26E+01	3.03E+01	0.17
1100.00	1134.16	4.13E-03	2.15E+00	7.01E+00	1.37E+01	5.13E-01	5.35E-01	7.02E+00	1.69E+01	0.15
1200.00	1231.39	1.35E-03	1.10E+00	4.11E+00	8.24E+00	3.27E-01	2.71E-01	4.11E+00	9.94E+00	0.12

Table 114. Henre source prompt plus delayed armor shielded tissue dose vs. range for a 100.0 KT weapon burst 278.00 meters above ground.

RANGE (METERS)		TISSUE DOSE (RADS)										NEUTRON/ GAMMA RATIO
GROUND	SLANT	NEUTRON		GAMMA		SECONDARY GAMMA			NEUTRON PLUS GAMMA			
		UNCOLLIDED	TOTAL	UNCOLLIDED	TOTAL	AIR-GROUND	ARMOR	UNCOLLIDED	TOTAL			
100.00	293.79	3.88E+06	5.57E+07	4.94E+04	7.00E+04	1.88E+06	5.41E+06	3.93E+06	6.31E+07	7.58		
200.00	341.05	2.01E+06	3.58E+07	3.10E+04	4.49E+04	1.29E+06	3.30E+06	2.05E+06	4.04E+07	7.71		
300.00	407.82	8.50E+05	1.98E+07	1.71E+04	2.65E+04	8.19E+05	2.05E+06	8.67E+05	2.27E+07	6.82		
400.00	486.12	3.32E+05	9.62E+06	9.12E+03	1.44E+04	4.54E+05	1.13E+06	3.41E+05	1.12E+07	6.01		
500.00	571.24	1.27E+05	4.74E+06	4.85E+03	8.14E+03	2.64E+05	5.90E+05	1.32E+05	5.60E+06	5.50		
600.00	660.54	4.86E+04	2.33E+06	2.62E+03	4.68E+03	1.58E+05	3.44E+05	5.12E+04	2.84E+06	4.60		
700.00	752.54	1.88E+04	1.15E+06	1.46E+03	2.67E+03	9.52E+04	1.94E+05	2.03E+04	1.45E+06	3.96		
800.00	846.35	7.41E+03	5.85E+05	8.39E+02	1.54E+03	5.84E+04	1.12E+05	8.25E+03	7.57E+05	3.40		
900.00	941.44	2.96E+03	3.08E+05	4.94E+02	9.17E+02	3.65E+04	6.82E+04	3.46E+03	4.14E+05	2.92		
1000.00	1037.46	1.20E+03	1.69E+05	2.98E+02	5.72E+02	2.31E+04	4.02E+04	1.50E+03	2.33E+05	2.65		
1100.00	1134.16	4.96E+02	9.54E+04	1.83E+02	3.69E+02	1.47E+04	2.34E+04	6.79E+02	1.34E+05	2.48		
1200.00	1231.39	2.07E+02	5.44E+04	1.14E+02	2.43E+02	9.40E+03	1.36E+04	3.21E+02	7.76E+04	2.35		

Table 115. 5.0 KT EM-1 fission source total free-field tissue dose (rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST											
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS		476.00 METERS	
GROUND	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO
100.00	1.60E+06	3.72	1.94E+06	4.77	1.64E+06	12.09	9.01E+05	9.46	2.08E+05	4.54	4.10E+04	3.67
200.00	3.33E+05	2.43	3.71E+05	2.94	3.79E+05	8.29	3.17E+05	7.27	1.30E+05	4.04	2.96E+04	3.26
300.00	1.10E+05	1.75	1.18E+05	2.05	1.22E+05	6.53	1.16E+05	5.84	7.20E+04	3.74	2.05E+04	3.07
400.00	4.33E+04	1.39	4.56E+04	1.61	4.51E+04	5.30	4.86E+04	5.25	3.53E+04	3.25	1.37E+04	3.02
500.00	1.82E+04	1.24	1.91E+04	1.42	1.82E+04	4.41	2.18E+04	4.75	1.69E+04	2.84	8.17E+03	2.83
600.00	8.14E+03	1.12	8.50E+03	1.28	7.92E+03	3.69	9.94E+03	4.19	8.53E+03	2.56	4.84E+03	2.72
700.00	3.76E+03	1.05	3.92E+03	1.21	3.64E+03	3.20	4.63E+03	3.64	4.35E+03	2.44	2.65E+03	2.48
800.00	1.86E+03	0.95	1.94E+03	1.09	1.77E+03	2.74	2.25E+03	3.08	2.34E+03	2.29	1.46E+03	2.13
900.00	9.36E+02	0.89	9.72E+02	1.03	8.93E+02	2.39	1.13E+03	2.67	1.32E+03	2.38	8.13E+02	1.96
1000.00	4.95E+02	0.82	5.12E+02	0.95	4.71E+02	2.06	5.86E+02	2.30	7.78E+02	2.44	4.74E+02	1.82
1100.00	2.64E+02	0.78	2.74E+02	0.90	2.54E+02	1.84	3.12E+02	2.03	4.49E+02	2.43	2.76E+02	1.67
1200.00	1.47E+02	0.74	1.52E+02	0.84	1.41E+02	1.63	1.72E+02	1.73	2.55E+02	2.25	1.69E+02	1.59
												8.54E+01 1.79

Table 116. 5.0 KT EM-1 fission source total armor shielded tissue dose (rads) and neutron/gamma dose ratios.

[illegible]

Table 117.

HEIGHT OF BURST

Table 118. 10.0 KT EM-1 fission source total armor shielded tissue dose (rads) and neutron gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST									
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS	
GROUND	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO
	100.00	2.75E+06 3.81	3.44E+06 3.81	3.29E+06 3.79	1.79E+06 3.36	1.79E+06 3.36	3.48E+05 2.79	5.69E+04 2.32	4.42E+03 1.78	
200.00	5.08E+05 2.93	5.90E+05 3.01	6.95E+05 3.36	5.78E+05 3.17	2.09E+05 2.65	4.07E+04 2.26	2.91E+03 1.71	2.11E+03 1.65	1.53E+03 1.58	
300.00	1.48E+05 2.36	1.65E+05 2.45	2.05E+05 2.95	1.93E+05 2.86	1.07E+05 2.49	2.72E+04 2.16	1.70E+04 2.07	5.51E+03 1.79	7.36E+02 1.43	
400.00	5.25E+04 2.00	5.75E+04 2.07	7.02E+04 2.61	7.28E+04 2.60	4.84E+04 2.32	1.70E+04 2.07	5.51E+03 1.79	4.75E+02 1.33	3.13E+02 1.24	
500.00	2.05E+04 1.78	2.22E+04 1.84	2.65E+04 2.33	3.02E+04 2.34	2.20E+04 2.10	9.84E+03 1.94	1.11E+03 1.50	2.10E+02 1.15	1.38E+02 1.06	
600.00	8.58E+03 1.58	9.29E+03 1.63	1.08E+04 2.08	1.31E+04 2.10	1.04E+04 1.90	5.51E+03 1.79	1.11E+03 1.50	8.28E+01 1.00		
700.00	3.81E+03 1.43	4.12E+03 1.47	4.70E+03 1.88	5.87E+03 1.89	5.05E+03 1.74	2.95E+03 1.65	7.36E+02 1.43			
800.00	1.81E+03 1.28	1.95E+03 1.32	2.17E+03 1.69	2.74E+03 1.70	2.58E+03 1.58	1.57E+03 1.50	4.75E+02 1.33			
900.00	8.89E+02 1.17	9.58E+02 1.20	1.05E+03 1.52	1.32E+03 1.54	1.41E+03 1.45	8.53E+02 1.39	3.13E+02 1.24			
1000.00	4.60E+02 1.06	4.95E+02 1.08	5.33E+02 1.38	6.65E+02 1.39	8.08E+02 1.32	4.81E+02 1.27	2.10E+02 1.15			
1100.00	2.46E+02 0.97	2.63E+02 1.00	2.81E+02 1.25	3.46E+02 1.27	4.61E+02 1.21	2.76E+02 1.16	1.38E+02 1.06			
1200.00	1.36E+02 0.90	1.45E+02 0.92	1.53E+02 1.14	1.85E+02 1.15	2.61E+02 1.11	1.63E+02 1.07	8.28E+01 1.00			

Table 119. 30.0 kT EM-1 fission source total free-field tissue dose (rads) and neutron/gamma dose ratios.

[illegible]

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Table 122. 100.0 KT EM-1 fission source total armor shielded tissue dose (rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST									
	1.00 METERS	13.00 METERS	60.00 METERS	129.00 METERS	278.00 METERS	476.00 METERS	800.00 METERS	1.00 METERS	13.00 METERS	60.00 METERS
GROUND	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE
	N/G RATIO	N/G RATIO	N/G RATIO	N/G RATIO	N/G RATIO	N/G RATIO	N/G RATIO	N/G RATIO	N/G RATIO	N/G RATIO
100.00	2.74E+07 3.85	3.43E+07 3.84	3.33E+07 3.62	1.79E+07 3.39	3.45E+06 2.83	5.82E+05 2.25	4.57E+04 1.70	2.74E+07 3.85	3.43E+07 3.84	3.33E+07 3.62
200.00	5.06E+06 2.95	5.88E+06 3.03	7.13E+06 3.11	5.76E+06 3.19	2.07E+06 2.68	4.18E+05 2.18	4.21E+04 1.68	5.06E+06 2.95	5.88E+06 3.03	7.13E+06 3.11
300.00	1.48E+06 2.35	1.65E+06 2.43	2.15E+06 2.60	1.93E+06 2.86	1.06E+06 2.51	2.80E+05 2.09	3.02E+04 1.62	1.48E+06 2.35	1.65E+06 2.43	2.15E+06 2.60
400.00	5.38E+05 1.87	5.89E+05 1.95	7.65E+05 2.17	7.30E+05 2.60	4.83E+05 2.33	1.76E+05 1.99	2.20E+04 1.56	5.38E+05 1.87	5.89E+05 1.95	7.65E+05 2.17
500.00	2.27E+05 1.48	2.45E+05 1.55	3.04E+05 1.82	3.02E+05 2.35	2.20E+05 2.13	1.01E+05 1.86	1.59E+04 1.49	2.27E+05 1.48	2.45E+05 1.55	3.04E+05 1.82
600.00	1.07E+05 1.18	1.14E+05 1.23	1.26E+05 1.62	1.31E+05 2.11	1.03E+05 1.95	5.68E+04 1.73	1.16E+04 1.41	1.07E+05 1.18	1.14E+05 1.23	1.26E+05 1.62
700.00	5.44E+04 0.98	5.74E+04 1.03	5.53E+04 1.45	5.86E+04 1.91	4.99E+04 1.79	3.03E+04 1.59	7.65E+03 1.35	5.44E+04 0.98	5.74E+04 1.03	5.53E+04 1.45
800.00	3.01E+04 0.82	3.15E+04 0.86	2.58E+04 1.29	2.72E+04 1.73	2.54E+04 1.64	1.62E+04 1.45	4.95E+03 1.26	3.01E+04 0.82	3.15E+04 0.86	2.58E+04 1.29
900.00	1.51E+04 0.75	1.57E+04 0.78	1.25E+04 1.17	1.31E+04 1.57	1.39E+04 1.50	8.77E+03 1.34	3.26E+03 1.18	1.51E+04 0.75	1.57E+04 0.78	1.25E+04 1.17
1000.00	7.98E+03 0.68	8.29E+03 0.71	6.38E+03 1.05	6.58E+03 1.43	7.92E+03 1.37	4.95E+03 1.23	2.18E+03 1.09	7.98E+03 0.68	8.29E+03 0.71	6.38E+03 1.05
1100.00	4.17E+03 0.62	4.34E+03 0.64	3.35E+03 0.96	3.41E+03 1.30	4.53E+03 1.25	2.82E+03 1.13	1.43E+03 1.02	4.17E+03 0.62	4.34E+03 0.64	3.35E+03 0.96
1200.00	2.29E+03 0.57	2.38E+03 0.59	1.82E+03 0.88	1.82E+03 1.19	2.56E+03 1.15	1.67E+03 1.04	8.59E+02 0.95	2.29E+03 0.57	2.38E+03 0.59	1.82E+03 0.88

Table 123. 5.0 kT low yield thermonuclear source total free-field tissue dose (rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST																				
	1.00 METERS			13.00 METERS			60.00 METERS			129.00 METERS			278.00 METERS			476.00 METERS			800.00 METERS		
	TOTAL DOSE	N/C RATIO		TOTAL DOSE	N/C RATIO		TOTAL DOSE	N/C RATIO		TOTAL DOSE	N/C RATIO		TOTAL DOSE	N/C RATIO		TOTAL DOSE	N/C RATIO		TOTAL DOSE	N/C RATIO	
GROUND																					
100.00	1.90E+06	3.58		2.32E+06	4.29		2.06E+06	6.05		1.12E+06	5.60		2.49E+05	4.05		4.92E+04	3.53		4.93E+03	2.61	
200.00	3.73E+05	2.63		4.25E+05	3.22		4.75E+05	5.03		3.94E+05	4.87		1.55E+05	3.82		3.56E+04	3.23		4.65E+03	2.89	
300.00	1.18E+05	2.30		1.29E+05	2.58		1.53E+05	4.47		1.44E+05	4.32		8.54E+04	3.65		2.46E+04	3.09		3.36E+03	2.48	
400.00	4.48E+04	1.95		4.83E+04	2.18		5.66E+04	3.92		5.99E+04	4.11		4.16E+04	3.33		1.64E+04	3.05		2.50E+03	2.28	
500.00	1.88E+04	1.75		2.00E+04	1.95		2.30E+04	3.43		2.69E+04	3.84		2.01E+04	2.95		9.89E+03	2.82		1.85E+03	2.22	
600.00	8.40E+03	1.58		8.96E+03	1.75		1.01E+04	2.98		1.24E+04	3.41		1.02E+04	2.67		5.87E+03	2.71		1.38E+03	2.28	
700.00	3.94E+03	1.45		4.20E+03	1.61		4.69E+03	2.63		5.89E+03	2.96		5.27E+03	2.49		3.28E+03	2.44		9.57E+02	2.15	
800.00	1.97E+03	1.30		2.09E+03	1.45		2.30E+03	2.31		2.90E+03	2.54		2.85E+03	2.33		1.83E+03	2.12		6.30E+02	1.94	
900.00	1.01E+03	1.21		1.07E+03	1.35		1.18E+03	2.06		1.49E+03	2.23		1.64E+03	2.34		1.04E+03	1.91		4.26E+02	1.84	
1000.00	5.41E+02	1.11		5.73E+02	1.24		6.28E+02	1.83		7.87E+02	1.96		9.76E+02	2.33		6.19E+02	1.76		2.93E+02	1.87	
1100.00	2.96E+02	1.04		3.14E+02	1.15		3.44E+02	1.65		4.23E+02	1.75		5.75E+02	2.25		3.68E+02	1.61		1.94E+02	1.81	
1200.00	1.67E+02	0.97		1.77E+02	1.07		1.94E+02	1.50		2.40E+02	1.57		3.35E+02	2.06		2.27E+02	1.53		1.21E+02	1.58	

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5.0 KT low yield thermonuclear source total armor shielded tissue dose (rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST													
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS		476.00 METERS		800.00 METERS	
GROUND	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO
100.00	1.80E+06	2.33	2.25E+06	2.31	2.15E+06	2.28	1.16E+06	2.20	2.23E+05	2.13	3.71E+04	1.94	2.88E+03	1.70
200.00	3.23E+05	2.15	3.76E+05	2.18	4.52E+05	2.24	3.73E+05	2.22	1.33E+05	2.10	2.65E+04	1.96	2.65E+03	1.70
300.00	9.17E+04	2.00	1.03E+05	2.03	1.33E+05	2.14	1.25E+05	2.14	6.84E+04	2.05	1.76E+04	1.93	1.90E+03	1.74
400.00	3.17E+04	1.87	3.49E+04	1.90	4.58E+04	2.04	4.75E+04	2.02	3.10E+04	1.99	1.10E+04	1.88	1.39E+03	1.69
500.00	1.23E+04	1.74	1.34E+04	1.78	1.74E+04	1.93	1.97E+04	1.90	1.41E+04	1.91	6.38E+03	1.82	1.01E+03	1.62
600.00	5.09E+03	1.66	5.53E+03	1.70	6.99E+03	1.88	8.42E+03	1.87	6.56E+03	1.88	3.52E+03	1.77	7.31E+02	1.52
700.00	2.29E+03	1.52	2.48E+03	1.56	3.07E+03	1.74	3.81E+03	1.74	3.21E+03	1.74	1.90E+03	1.67	4.88E+02	1.46
800.00	1.09E+03	1.38	1.18E+03	1.42	1.43E+03	1.59	1.79E+03	1.61	1.65E+03	1.60	1.02E+03	1.56	3.17E+02	1.37
900.00	5.44E+02	1.26	5.84E+02	1.30	6.96E+02	1.46	8.71E+02	1.48	9.05E+02	1.45	5.56E+02	1.45	2.10E+02	1.27
1000.00	2.83E+02	1.15	3.03E+02	1.19	3.55E+02	1.34	4.41E+02	1.37	5.18E+02	1.33	3.17E+02	1.33	1.40E+02	1.20
1100.00	1.52E+02	1.06	1.63E+02	1.10	1.88E+02	1.24	2.31E+02	1.27	2.97E+02	1.24	1.83E+02	1.23	9.22E+01	1.13
1200.00	8.44E+01	0.98	8.98E+01	1.02	1.02E+02	1.15	1.25E+02	1.16	1.68E+02	1.16	1.08E+02	1.13	5.62E+01	1.05

Table 125. 10.0 kT low yield thermonuclear source total free-field tissue dose (rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST													
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS		476.00 METERS		800.00 METERS	
GROUND	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO
100.00	3.79E+06	3.62	4.63E+06	4.34	4.12E+06	6.07	2.23E+06	5.75	4.99E+05	4.04	9.89E+04	3.46	9.91E+03	2.57
200.00	7.47E+05	2.82	8.52E+05	3.18	9.49E+05	5.06	7.82E+05	5.03	3.10E+05	3.80	7.16E+04	3.16	9.35E+03	2.84
300.00	2.38E+05	2.20	2.62E+05	2.44	3.05E+05	4.53	2.85E+05	4.48	1.71E+05	3.63	4.96E+04	3.02	6.76E+03	2.44
400.00	9.21E+04	1.81	9.98E+04	1.99	1.13E+05	4.00	1.19E+05	4.27	8.34E+04	3.29	3.30E+04	2.98	5.02E+03	2.24
500.00	3.88E+04	1.61	4.16E+04	1.77	4.58E+04	3.51	5.34E+04	3.99	4.04E+04	2.91	1.99E+04	2.77	3.72E+03	2.19
600.00	1.75E+04	1.45	1.87E+04	1.59	2.00E+04	3.06	2.46E+04	3.53	2.05E+04	2.64	1.18E+04	2.66	2.77E+03	2.25
700.00	8.18E+03	1.34	8.74E+03	1.47	9.30E+03	2.70	1.17E+04	3.06	1.06E+04	2.45	6.59E+03	2.39	1.92E+03	2.13
800.00	4.08E+03	1.21	4.36E+03	1.33	4.56E+03	2.37	5.76E+03	2.62	5.73E+03	2.30	3.69E+03	2.08	1.27E+03	1.92
900.00	2.09E+03	1.13	2.23E+03	1.24	2.34E+03	2.11	2.95E+03	2.28	3.29E+03	2.31	2.10E+03	1.88	8.57E+02	1.82
1000.00	1.12E+03	1.04	1.19E+03	1.14	1.24E+03	1.87	1.56E+03	2.00	1.96E+03	2.30	1.25E+03	1.73	5.89E+02	1.85
1100.00	6.12E+02	0.97	6.51E+02	1.07	6.83E+02	1.69	8.50E+02	1.79	1.15E+03	2.23	7.40E+02	1.59	3.90E+02	1.79
1200.00	3.47E+02	0.91	3.68E+02	1.00	3.85E+02	1.52	4.76E+02	1.60	6.70E+02	2.05	4.57E+02	1.51	2.42E+02	1.57

Table 126. 10.0 KT low yield thermonuclear source total armor shielded tissue dose (rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST									
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS	
GROUND	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO
	1.00 METERS	13.00 METERS	60.00 METERS	129.00 METERS	278.00 METERS	800.00 METERS	476.00 METERS	800.00 METERS	476.00 METERS	800.00 METERS
100.00	3.61E+06 2.33	4.50E+06 2.31	4.31E+06 2.28	2.32E+06 2.20	4.46E+05 2.12	7.43E+04 1.94	5.77E+03 1.78	5.77E+03 1.78	7.43E+04 1.94	5.77E+03 1.78
200.00	6.46E+05 2.15	7.53E+05 2.17	9.03E+05 2.24	7.46E+05 2.22	2.67E+05 2.10	5.30E+04 1.96	5.32E+03 1.70	5.32E+03 1.70	5.30E+04 1.96	5.32E+03 1.70
300.00	1.84E+05 1.98	2.07E+05 2.01	2.66E+05 2.14	2.50E+05 2.14	1.37E+05 2.05	3.53E+04 1.93	3.81E+03 1.73	3.81E+03 1.73	3.53E+04 1.93	3.81E+03 1.73
400.00	6.40E+04 1.84	7.06E+04 1.87	9.15E+04 2.05	9.49E+04 2.02	6.21E+04 1.99	2.21E+04 1.88	2.79E+03 1.68	2.79E+03 1.68	2.21E+04 1.99	2.79E+03 1.68
500.00	2.49E+04 1.72	2.72E+04 1.75	3.47E+04 1.94	3.94E+04 1.91	2.83E+04 1.91	1.28E+04 1.82	2.01E+03 1.62	2.01E+03 1.62	2.83E+04 1.91	2.01E+03 1.62
600.00	1.03E+04 1.64	1.12E+04 1.67	1.40E+04 1.89	1.68E+04 1.88	1.31E+04 1.88	7.06E+03 1.77	1.46E+03 1.52	1.46E+03 1.52	1.31E+04 1.88	7.06E+03 1.77
700.00	4.64E+03 1.50	5.03E+03 1.53	6.13E+03 1.74	7.60E+03 1.75	6.43E+03 1.74	3.80E+03 1.66	9.77E+02 1.45	9.77E+02 1.45	6.43E+03 1.74	3.80E+03 1.66
800.00	2.21E+03 1.36	2.39E+03 1.39	2.85E+03 1.60	3.57E+03 1.62	3.30E+03 1.59	2.04E+03 1.55	6.35E+02 1.36	6.35E+02 1.36	3.30E+03 1.59	2.04E+03 1.55
900.00	1.10E+03 1.24	1.18E+03 1.27	1.39E+03 1.47	1.74E+03 1.49	1.81E+03 1.45	1.11E+03 1.45	4.21E+02 1.27	4.21E+02 1.27	1.81E+03 1.45	1.11E+03 1.45
1000.00	5.71E+02 1.13	6.14E+02 1.17	7.08E+02 1.35	8.79E+02 1.38	1.04E+03 1.33	6.34E+02 1.33	2.80E+02 1.19	2.80E+02 1.19	1.04E+03 1.33	6.34E+02 1.33
1100.00	3.08E+02 1.04	3.29E+02 1.08	3.75E+02 1.24	4.60E+02 1.28	5.94E+02 1.24	3.66E+02 1.22	1.85E+02 1.12	1.85E+02 1.12	5.94E+02 1.24	3.66E+02 1.22
1200.00	1.71E+02 0.96	1.82E+02 1.00	2.10E+02 1.16	2.49E+02 1.17	3.37E+02 1.16	2.18E+02 1.13	1.13E+02 1.05	1.13E+02 1.05	3.37E+02 1.16	2.18E+02 1.13

Table 127.

HEIGHT OF BURST

Table 128.

HEIGHT OF BURST

HEIGHT OF BURST

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HEIGHT OF BURST

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Table 131. 5.0 KT Henre source total free-field tissue dose
(rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST									
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS	
GROUND	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO
	1.00 METERS	13.00 METERS	60.00 METERS	129.00 METERS	278.00 METERS	476.00 METERS	800.00 METERS	1.00 METERS	13.00 METERS	60.00 METERS
100.00	2.47E+07 14.90	3.03E+07 13.33	2.69E+07 11.06	1.54E+07 9.82	3.80E+06 8.37	8.63E+05 6.20	1.06E+05 3.99	2.47E+07 14.90	3.03E+07 13.33	2.69E+07 11.06
200.00	5.19E+06 10.31	5.95E+06 10.35	6.86E+06 9.94	5.80E+06 9.27	2.48E+06 7.86	6.57E+05 6.08	9.40E+04 3.90	5.19E+06 10.31	5.95E+06 10.35	6.86E+06 9.94
300.00	1.74E+06 8.04	1.91E+06 8.17	2.43E+06 8.38	2.31E+06 8.18	1.42E+06 6.97	4.66E+05 5.68	7.43E+04 3.75	1.74E+06 8.04	1.91E+06 8.17	2.43E+06 8.38
400.00	6.93E+05 6.53	7.51E+05 6.62	9.83E+05 7.06	9.94E+05 6.81	7.19E+05 6.31	3.09E+05 5.14	5.74E+04 3.57	6.93E+05 6.53	7.51E+05 6.62	9.83E+05 7.06
500.00	3.06E+05 5.44	3.29E+05 5.49	4.29E+05 5.93	4.64E+05 5.81	3.76E+05 5.60	1.95E+05 4.72	4.31E+04 3.37	3.06E+05 5.44	3.29E+05 5.49	4.29E+05 5.93
600.00	1.44E+05 4.59	1.55E+05 4.64	1.99E+05 5.01	2.29E+05 5.07	1.99E+05 4.87	1.17E+05 4.25	3.18E+04 3.24	1.44E+05 4.59	1.55E+05 4.64	1.99E+05 5.01
700.00	7.16E+04 3.93	7.71E+04 3.99	9.79E+04 4.28	1.17E+05 4.44	1.07E+05 4.28	6.96E+04 3.88	2.26E+04 3.07	7.16E+04 3.93	7.71E+04 3.99	9.79E+04 4.28
800.00	3.72E+04 3.43	4.01E+04 3.48	5.05E+04 3.72	6.18E+04 3.92	5.97E+04 3.83	4.14E+04 3.50	1.56E+04 2.90	3.72E+04 3.43	4.01E+04 3.48	5.05E+04 3.72
900.00	2.01E+04 3.05	2.17E+04 3.10	2.71E+04 3.30	3.36E+04 3.49	3.47E+04 3.51	2.50E+04 3.18	1.09E+04 2.78	2.01E+04 3.05	2.17E+04 3.10	2.71E+04 3.30
1000.00	1.12E+04 2.76	1.21E+04 2.81	1.51E+04 2.98	1.88E+04 3.15	2.09E+04 3.32	1.53E+04 2.92	7.54E+03 2.73	1.12E+04 2.76	1.21E+04 2.81	1.51E+04 2.98
1100.00	6.45E+03 2.53	6.97E+03 2.58	8.68E+03 2.74	1.08E+04 2.89	1.28E+04 3.17	9.53E+03 2.74	5.13E+03 2.68	6.45E+03 2.53	6.97E+03 2.58	8.68E+03 2.74
1200.00	3.77E+03 2.35	4.07E+03 2.39	5.06E+03 2.53	6.30E+03 2.66	7.84E+03 3.01	5.97E+03 2.59	3.34E+03 2.49	3.77E+03 2.35	4.07E+03 2.39	5.06E+03 2.53

Table 132.

HEIGHT OF BURST

Table 133. 10.0 KT Henre source total free-field tissue dose
(rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST									
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS	
	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO	TOTAL DOSE	N/G RATIO
GROUND										
100.00	4.95E+07 14.91	6.05E+07 13.33	5.38E+07 11.07	3.07E+07 9.83	7.61E+06 8.37	1.73E+06 6.20	2.13E+05 3.99			
200.00	1.04E+07 10.31	1.19E+07 10.35	1.37E+07 9.94	1.16E+07 9.28	4.95E+06 7.86	1.31E+06 6.08	1.88E+05 3.90			
300.00	3.47E+06 8.03	3.83E+06 8.16	4.86E+06 8.38	4.63E+06 8.18	2.83E+06 6.97	9.32E+05 5.67	1.49E+05 3.75			
400.00	1.39E+06 6.52	1.50E+06 6.60	1.97E+06 7.07	1.99E+06 6.82	1.44E+06 6.31	6.18E+05 5.14	1.15E+05 3.57			
500.00	6.11E+05 5.42	6.58E+05 5.48	8.58E+05 5.94	9.28E+05 5.82	7.51E+05 5.60	3.90E+05 4.72	8.61E+04 3.37			
600.00	2.88E+05 4.58	3.10E+05 4.63	3.99E+05 5.01	4.58E+05 5.07	3.98E+05 4.87	2.34E+05 4.24	6.36E+04 3.24			
700.00	1.43E+05 3.93	1.54E+05 3.98	1.96E+05 4.28	2.34E+05 4.45	2.14E+05 4.28	1.39E+05 3.88	4.52E+04 3.07			
800.00	7.45E+04 3.43	8.02E+04 3.48	1.01E+05 3.72	1.24E+05 3.92	1.19E+05 3.83	8.28E+04 3.50	3.12E+04 2.90			
900.00	4.02E+04 3.05	4.34E+04 3.10	5.43E+04 3.30	6.72E+04 3.49	6.94E+04 3.51	4.99E+04 3.18	2.17E+04 2.78			
1000.00	2.25E+04 2.76	2.43E+04 2.80	3.02E+04 2.98	3.76E+04 3.15	4.18E+04 3.31	3.07E+04 2.92	1.51E+04 2.73			
1100.00	1.29E+04 2.53	1.39E+04 2.58	1.74E+04 2.74	2.16E+04 2.89	2.56E+04 3.17	1.91E+04 2.74	1.03E+04 2.68			
1200.00	7.53E+03 2.35	8.15E+03 2.39	1.01E+04 2.54	1.26E+04 2.66	1.57E+04 3.01	1.19E+04 2.59	6.68E+03 2.49			

Table 134.

HEIGHT OF BURST

Table 135. 30.0 KT Henre source total free-field tissue dose
(rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST									
	1.00 METERS	13.00 METERS	60.00 METERS	129.00 METERS	278.00 METERS	476.00 METERS	800.00 METERS	TOTAL DOSE	N/G RATIO	
GROUND	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE	TOTAL DOSE			
100.00	1.48E+08 14.92	1.82E+08 13.34	1.61E+08 11.05	9.22E+07 9.83	2.28E+07 8.38	5.18E+06 6.19	6.39E+05 3.98			
200.00	3.11E+07 10.32	3.57E+07 10.35	4.11E+07 9.92	3.48E+07 9.28	1.49E+07 7.95	3.95E+06 6.07	5.64E+05 3.90			
300.00	1.04E+07 8.03	1.15E+07 8.16	1.46E+07 8.36	1.39E+07 8.19	8.50E+06 6.98	2.80E+06 5.67	4.46E+05 3.74			
400.00	4.16E+06 6.51	4.51E+06 6.59	5.90E+06 7.05	5.96E+06 6.82	4.32E+06 6.32	1.85E+06 5.13	3.45E+05 3.56			
500.00	1.84E+06 5.40	1.98E+06 5.46	2.58E+06 5.92	2.78E+06 5.82	2.25E+06 5.60	1.17E+06 4.72	2.58E+05 3.37			
600.00	8.66E+05 4.55	9.31E+05 4.60	1.20E+06 4.99	1.37E+06 5.07	1.19E+06 4.87	7.02E+05 4.24	1.91E+05 3.24			
700.00	4.31E+05 3.89	4.63E+05 3.95	5.88E+05 4.27	7.03E+05 4.45	6.43E+05 4.28	4.18E+05 3.88	1.36E+05 3.07			
800.00	2.24E+05 3.39	2.41E+05 3.44	3.03E+05 3.71	3.71E+05 3.92	3.58E+05 3.83	2.48E+05 3.50	9.37E+04 2.89			
900.00	1.21E+05 3.02	1.30E+05 3.07	1.63E+05 3.29	2.02E+05 3.49	2.08E+05 3.52	1.50E+05 3.18	6.51E+04 2.78			
1000.00	6.76E+04 2.73	7.29E+04 2.78	9.08E+04 2.98	1.13E+05 3.15	1.25E+05 3.32	9.20E+04 2.92	4.52E+04 2.73			
1100.00	3.88E+04 2.51	4.19E+04 2.56	5.21E+04 2.73	6.48E+04 2.89	7.68E+04 3.17	5.72E+04 2.74	3.08E+04 2.67			
1200.00	2.27E+04 2.34	2.45E+04 2.38	3.04E+04 2.53	3.78E+04 2.66	4.71E+04 3.01	3.58E+04 2.59	2.60E+04 2.49			

Table 136.

HEIGHT OF BURST

Table 137. 100.0 kT Henre source total free-field tissue dose (rads) and neutron/gamma dose ratios.

RANGE (METERS)	HEIGHT OF BURST													
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS		476.00 METERS		800.00 METERS	
GROUND	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO
100.00	4.95E+08	14.93	6.05E+08	13.35	5.38E+08	11.01	3.07E+08	9.83	7.60E+07	8.39	1.73E+07	6.19	2.13E+06	3.98
200.00	1.04E+08	10.32	1.19E+08	10.35	1.37E+08	9.87	1.16E+08	9.29	4.95E+07	7.87	1.32E+07	6.07	1.88E+06	3.89
300.00	3.47E+07	8.03	3.83E+07	8.16	4.87E+07	8.30	4.63E+07	8.19	2.83E+07	6.98	9.33E+06	5.66	1.49E+06	3.74
400.00	1.39E+07	6.49	1.50E+07	6.58	1.97E+07	6.98	1.99E+07	6.82	1.44E+07	6.32	6.18E+06	5.13	1.15E+06	3.56
500.00	6.12E+06	5.37	6.60E+06	5.42	8.60E+06	5.85	9.28E+06	5.82	7.51E+06	5.60	3.91E+06	4.71	8.62E+05	3.37
600.00	2.89E+06	4.49	3.11E+06	4.54	4.00E+06	4.94	4.58E+06	5.07	3.98E+06	4.87	2.34E+06	4.24	6.36E+05	3.24
700.00	1.44E+06	3.83	1.55E+06	3.88	1.96E+06	4.23	2.34E+06	4.45	2.14E+06	4.29	1.39E+06	3.87	4.52E+05	3.07
800.00	7.51E+05	3.31	8.08E+05	3.37	1.01E+06	3.68	1.24E+06	3.92	1.19E+06	3.83	8.28E+05	3.49	3.12E+05	2.89
900.00	4.05E+05	2.96	4.37E+05	3.01	5.44E+05	3.27	6.72E+05	3.49	6.94E+05	3.52	4.99E+05	3.17	2.17E+05	2.77
1000.00	2.27E+05	2.68	2.44E+05	2.73	3.03E+05	2.96	3.76E+05	3.15	4.18E+05	3.32	3.07E+05	2.92	1.51E+05	2.73
1100.00	1.30E+05	2.47	1.40E+05	2.52	1.74E+05	2.72	2.16E+05	2.89	2.56E+05	3.17	1.91E+05	2.73	1.03E+05	2.67
1200.00	7.59E+04	2.30	8.20E+04	2.34	1.01E+05	2.52	1.26E+05	2.66	1.57E+05	3.01	1.19E+05	2.59	6.68E+04	2.49

HEIGHT OF BURST

RANGE (METERS)	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS		476.00 METERS		800.00 METERS	
	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO	TOTAL DOSE	N/C RATIO
GROUND														
100.00	3.89E+08	8.43	4.68E+08	8.60	4.19E+08	8.27	2.45E+08	8.61	6.31E+07	7.58	1.37E+07	5.97	1.45E+06	3.56
200.00	8.37E+07	7.91	9.50E+07	8.42	1.10E+08	7.88	9.39E+07	8.27	4.04E+07	7.71	1.03E+07	6.15	1.27E+06	3.25
300.00	2.79E+07	7.00	3.06E+07	7.34	3.87E+07	7.50	3.70E+07	7.84	2.27E+07	6.82	7.17E+06	5.49	9.90E+05	3.27
400.00	1.09E+07	5.96	1.17E+07	6.20	1.52E+07	6.74	1.57E+07	6.09	1.12E+07	6.01	4.63E+06	4.83	7.59E+05	3.03
500.00	4.64E+06	5.07	4.97E+06	5.21	6.42E+06	5.74	7.00E+06	5.26	5.60E+06	5.50	2.79E+06	4.51	5.47E+05	2.92
600.00	2.10E+06	4.29	2.24E+06	4.38	2.86E+06	4.82	3.27E+06	4.67	2.84E+06	4.60	1.61E+06	3.76	3.87E+05	2.72
700.00	9.93E+05	3.65	1.06E+06	3.72	1.33E+06	4.05	1.58E+06	4.11	1.45E+06	3.96	9.11E+05	3.40	2.65E+05	2.52
800.00	4.70E+05	3.15	5.24E+05	3.20	6.51E+05	3.45	7.89E+05	3.60	7.57E+05	3.40	5.17E+05	3.03	1.78E+05	2.27
900.00	2.51E+05	2.75	2.68E+05	2.80	3.31E+05	2.99	4.05E+05	3.15	4.14E+05	2.92	2.96E+05	2.73	1.18E+05	2.14
1000.00	1.33E+05	2.46	1.42E+05	2.50	1.74E+05	2.65	2.14E+05	2.80	2.33E+05	2.65	1.72E+05	2.46	7.64E+04	2.13
1100.00	7.23E+04	2.24	7.74E+04	2.27	9.49E+04	2.40	1.17E+05	2.53	1.34E+05	2.48	1.01E+05	2.28	5.01E+04	2.04
1200.00	4.01E+04	2.07	4.31E+04	2.10	5.28E+04	2.20	6.47E+04	2.30	7.76E+04	2.35	6.04E+04	2.09	3.17E+04	1.93

5.0 KT EM-1 fission source free-field and armor shielded prompt/delayed tissue dose ratios.

HEIGHT (METERS)	1.00 METERS						13.00 METERS						60.00 METERS						129.00 METERS						278.00 METERS						476.00 METERS						800.00 METERS					
	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD														
100.00	5.18	27.61	6.88	36.69	41.93	223.16	24.49	124.46	7.71	37.68	6.87	33.86	7.30	31.42																												
200.00	3.28	16.36	4.04	20.41	23.30	114.29	17.31	84.92	6.77	33.92	6.15	30.75	7.95	32.36																												
300.00	2.30	10.86	2.73	13.08	17.42	84.46	13.74	68.11	6.32	31.14	5.80	28.66	7.07	29.30																												
400.00	1.80	8.07	2.13	9.61	13.89	67.91	12.45	59.05	5.51	26.50	5.72	26.89	6.74	28.03																												
500.00	1.63	7.16	1.91	8.41	11.54	54.95	11.30	50.95	4.97	23.34	5.48	24.82	6.74	27.21																												
600.00	1.53	6.65	1.78	7.73	9.58	43.53	10.17	44.28	4.59	20.30	5.39	22.90	7.25	27.91																												
700.00	1.52	6.43	1.77	7.46	8.58	37.22	9.18	38.69	4.61	19.27	5.22	21.47	7.23	26.40																												
800.00	1.42	5.87	1.66	6.81	7.38	30.50	7.81	31.79	4.42	17.43	4.63	18.36	6.38	23.09																												
900.00	1.43	5.69	1.68	6.62	6.57	25.88	7.04	27.47	4.84	17.82	4.56	17.21	6.50	22.81																												
1000.00	1.39	5.32	1.63	6.21	5.71	21.55	6.15	23.06	5.10	17.73	4.42	15.76	6.51	21.84																												
1100.00	1.41	5.27	1.65	6.08	5.32	19.44	5.74	20.71	5.39	18.09	4.27	14.71	6.65	21.89																												
1200.00	1.41	5.06	1.62	5.79	4.87	17.18	5.23	18.16	5.25	17.22	4.15	13.55	6.00	19.18																												

Table 140.

HEIGHT OF BURST

Table 141.

HEIGHT OF BURST

Table 142. 100.0 KT EM-1 fission source free-field and armor shielded prompt/delayed tissue dose ratios.

RANGE (METERS)	HEIGHT OF BURST											
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS		476.00 METERS	
GROUND	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD
100.00	5.94	31.52	7.97	42.39	10.43	57.14	66.00	340.81	12.42	55.71	4.56	17.58
200.00	3.48	17.33	4.18	20.88	5.81	29.09	40.16	185.06	10.26	45.39	3.87	15.36
300.00	2.11	9.73	2.42	11.16	3.57	16.40	22.19	95.37	8.33	34.96	3.46	13.84
400.00	1.30	5.61	1.46	6.28	2.24	9.74	16.50	67.19	6.42	25.76	3.44	13.62
500.00	0.82	3.33	0.91	3.69	1.49	6.10	15.09	62.23	5.49	22.06	3.26	13.02
600.00	0.53	2.07	0.59	2.29	1.30	5.16	13.79	56.97	5.49	22.18	3.20	12.40
700.00	0.38	1.44	0.43	1.59	1.23	4.93	13.68	55.72	5.97	23.45	3.20	12.25
800.00	0.27	0.99	0.30	1.09	1.12	4.45	12.64	50.35	6.12	23.21	2.91	10.97
900.00	0.26	0.96	0.29	1.06	1.12	4.36	11.94	45.76	6.85	24.53	2.93	10.73
1000.00	0.24	0.90	0.27	0.99	1.09	4.13	10.88	40.13	7.36	25.12	2.90	10.18
1100.00	0.24	0.93	0.27	1.02	1.11	4.09	10.40	37.01	7.82	25.83	2.93	9.98
1200.00	0.25	0.93	0.27	1.01	1.10	3.93	9.70	33.24	7.65	24.76	2.96	9.59
											3.17	10.31

Table 143.

HEIGHT OF BURST

Table 144.

HEIGHT OF BURST

HEIGHT OF BURST

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Table 146. 100.0 KT low yield thermonuclear source free-field and armor shielded prompt/delayed tissue dose ratios.

RANGE (METERS)	HEIGHT OF BURST													
	1.00 METERS		13.00 METERS		60.00 METERS		129.00 METERS		278.00 METERS		476.00 METERS		800.00 METERS	
GROUND	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD	FREE FIELD	ARMOR SHIELD
100.00	15.68	84.48	20.72	112.79	26.63	150.15	168.33	806.00	31.99	145.13	11.85	46.83	9.66	38.00
200.00	9.14	45.75	10.90	54.91	14.94	75.99	103.37	482.79	26.49	118.26	10.17	40.95	10.42	40.45
300.00	5.56	25.70	6.34	29.40	9.23	42.95	57.40	248.67	21.57	91.41	9.16	36.08	9.01	35.07
400.00	3.47	14.89	3.86	16.62	5.87	25.57	42.62	176.41	16.71	67.68	9.08	36.27	8.62	33.74
500.00	2.22	8.91	2.45	9.84	3.97	16.10	39.20	164.14	14.57	58.27	8.73	34.73	8.68	33.11
600.00	1.47	5.52	1.62	6.07	3.51	13.48	36.46	148.16	14.79	57.89	8.61	32.72	9.01	33.12
700.00	1.08	3.89	1.19	4.26	3.41	13.02	37.09	146.16	16.30	61.71	8.78	32.53	9.47	33.09
800.00	0.79	2.71	0.87	2.97	3.16	11.89	35.26	133.35	16.92	61.44	8.24	29.46	8.86	30.37
900.00	0.76	2.66	0.84	2.91	3.25	11.77	34.30	122.45	19.05	65.18	8.54	29.15	9.38	30.80
1000.00	0.72	2.52	0.79	2.75	3.22	11.23	32.19	108.48	20.64	66.82	8.64	28.00	9.62	29.94
1100.00	0.76	2.64	0.83	2.86	3.36	11.21	31.67	100.98	22.33	68.81	8.94	27.74	10.34	31.39
1200.00	0.78	2.66	0.85	2.87	3.41	10.83	30.31	91.90	22.47	66.27	9.15	26.86	9.92	29.03

6. COMPARISONS

This section presents comparisons of selected results of the handbook data base with published results and/or other calculational methods. In addition, results from sensitivity studies performed for the delayed dose component will be presented and discussed as well as a comparison with experimental data.

6.1 PROMPT AND DELAYED DOSE

Dose versus ground range results for radiation transport in an air over ground geometry from a 12.2 - 15.0 MeV neutron source and a fission source spectra⁽¹⁹⁾ were compared with values from the handbook data base. The sources are located 15.24 meters above the ground with the detector 0.5 meter above the ground. These two sources were folded with the prompt source energy importance distribution and a comparison of the neutron tissue dose is shown in Figures 19 and 20 and a comparison of the gamma ray tissue dose from secondary gamma rays produced in the air and ground is shown in Figures 21 and 22. The primary differences between the previous results and those presented here are in the cross sections and ground composition. The previous dose values were calculated using Straker cross sections while the handbook data base utilized the Young evaluation.

The effect of the different cross sections is most evident in the secondary gamma ray comparisons with the present results approximately a factor of 2 lower than the previous results. The ground composition used in the previous calculations contained 8.5 weight percent water compared with 3.0 weight percent for the handbook results. From the sensitivity analysis of ground composition and the effects of soil water content, the predicted dose from the handbook data base would be expected to be approximately 20% higher. This is

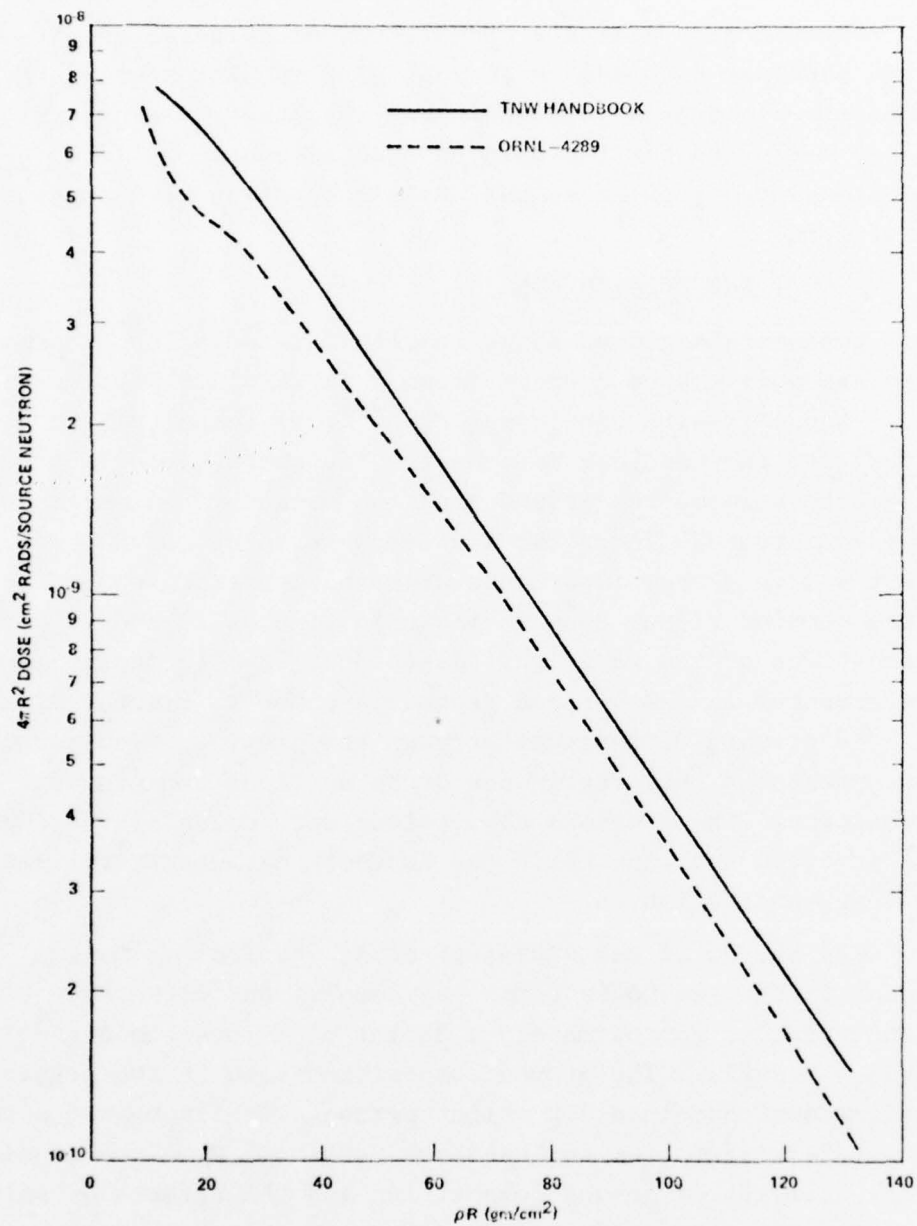


Figure 19. Calculated free-field neutron tissue dose from a 15.0 - 12.2 MeV neutron source 15.24 m above ground.

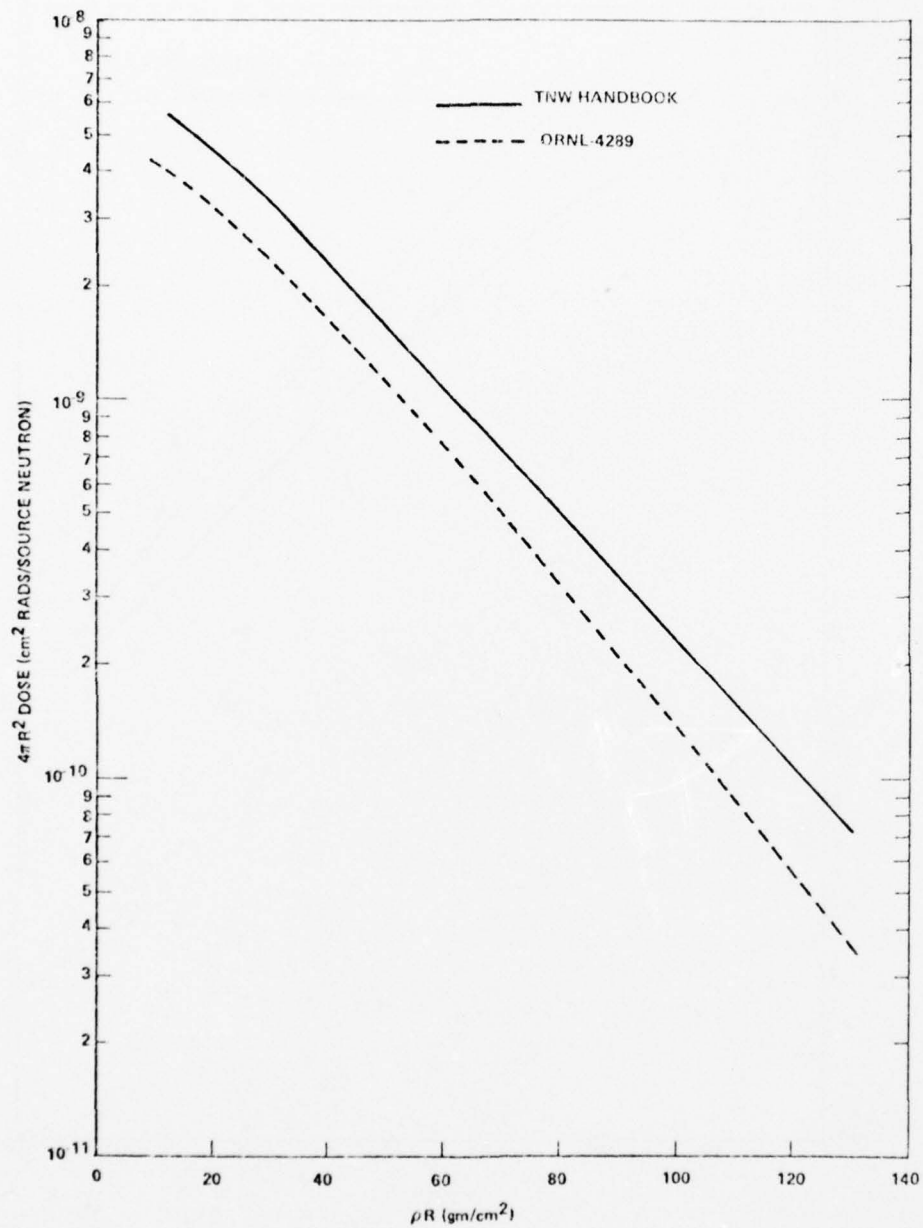


Figure 20. Calculated free-field neutron tissue dose from a fission source 15.24 m above ground.

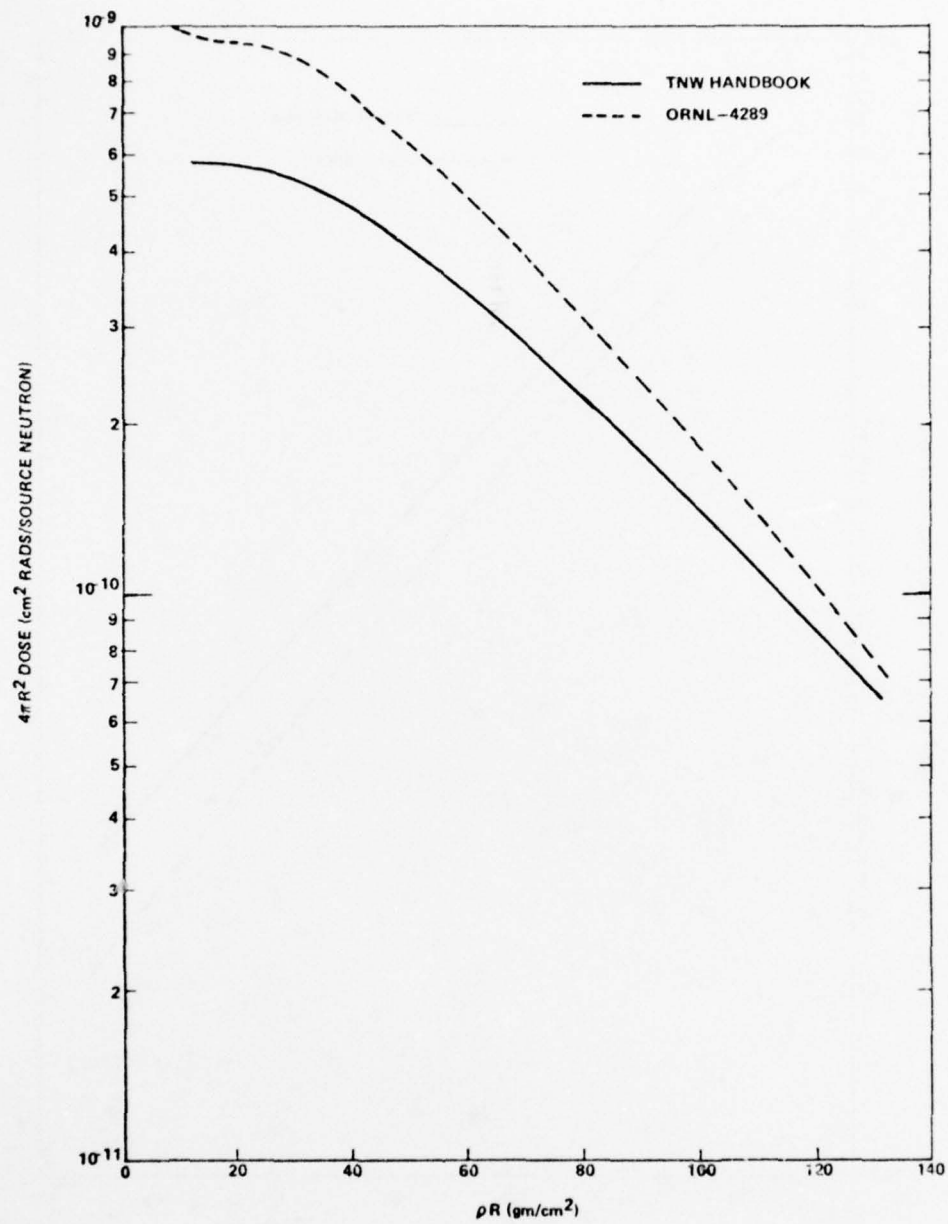


Figure 21. Calculated free-field secondary gamma ray tissue dose from a 15.0 - 12.2 MeV neutron source 15.24 m above ground.

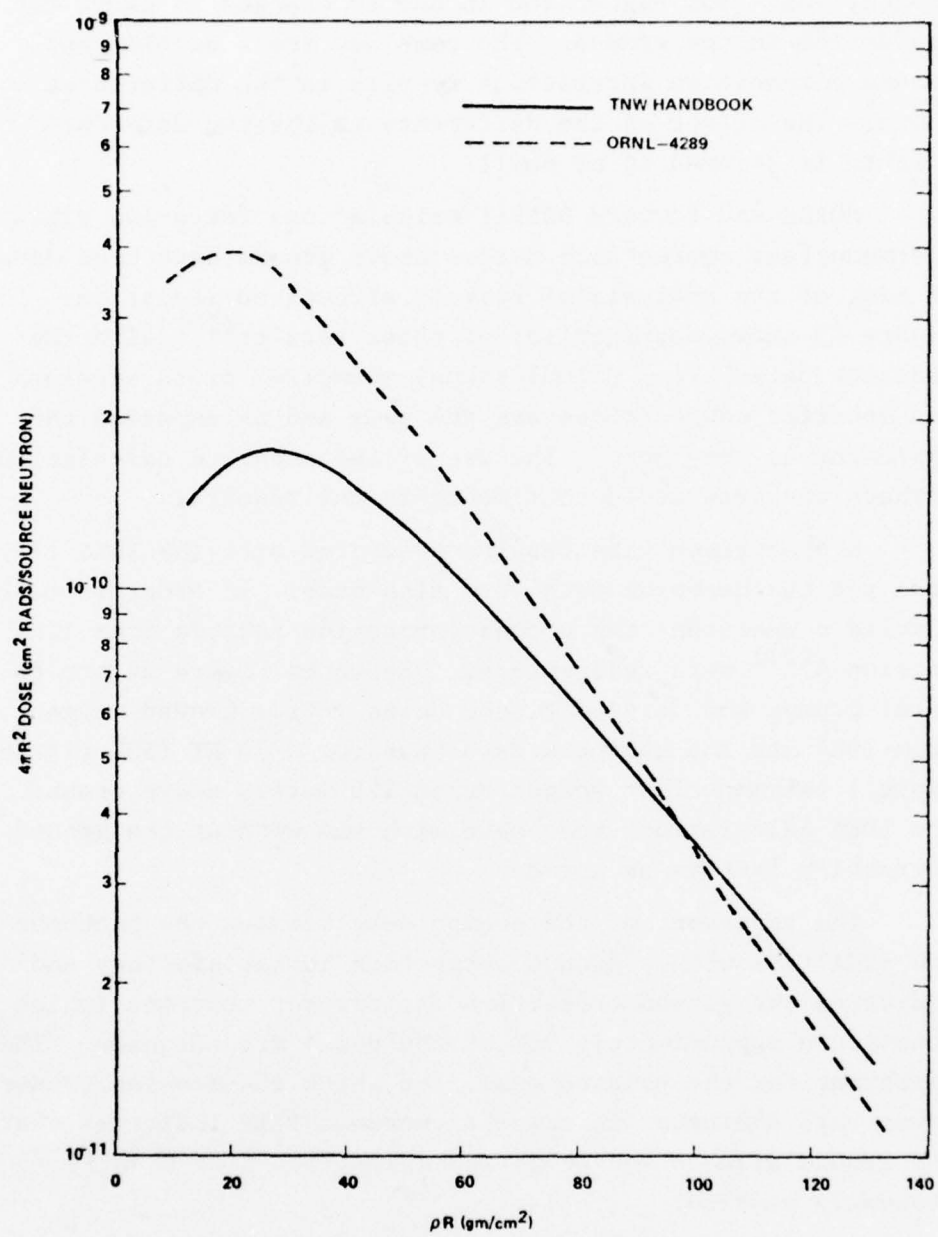


Figure 22. Calculated free-field secondary gamma ray tissue dose from a fission source 15.24 m above ground.

generally true for the neutron dose from the 14 MeV neutron source; however, the dose from the fission source is approximately 40% - 50% higher and is due to changes in gamma ray production in the ground. The combined cross section and ground composition interaction results in the differences shown. The effect of the difference in the two detector heights is assumed to be small.

MORSE and forward DOTSAI calculations for a low yield thermonuclear source 36.5 meters above ground have been made as part of the analysis of terrain effects on radiation. Figure 23 shows a comparison of these results⁽²⁰⁾ with the handbook data base. Calculational geometry, cross sections and material compositions are the same and as expected the agreement is very good. The use of two separate calculational methods provides added confidence in the results.

A comparison with results predicted with the IDEA (75) code and the handbook data were also made. In order to make a valid comparison, the ground correction factors from ATR-Version 4⁽²¹⁾ were incorporated. Shown in Figure 24 are the total prompt and delayed tissue doses versus ground range from IDEA and the handbook data base for a 10 KT (50% fission) typical thermonuclear weapon burst 129 meters above ground. The IDEA calculations were made with and without the ground correction factors as noted.

The agreement of the prompt dose between the handbook and IDEA (75) with a ground correction is satisfactory and indicates the ground correction factors for neutrons (which constitute approximately 90% of the dose) are adequate. The agreement for the delayed dose, for which the fission product gamma rays dominate, is somewhat worse. This indicates that the ground affects source gamma rays differently than is presently modeled.

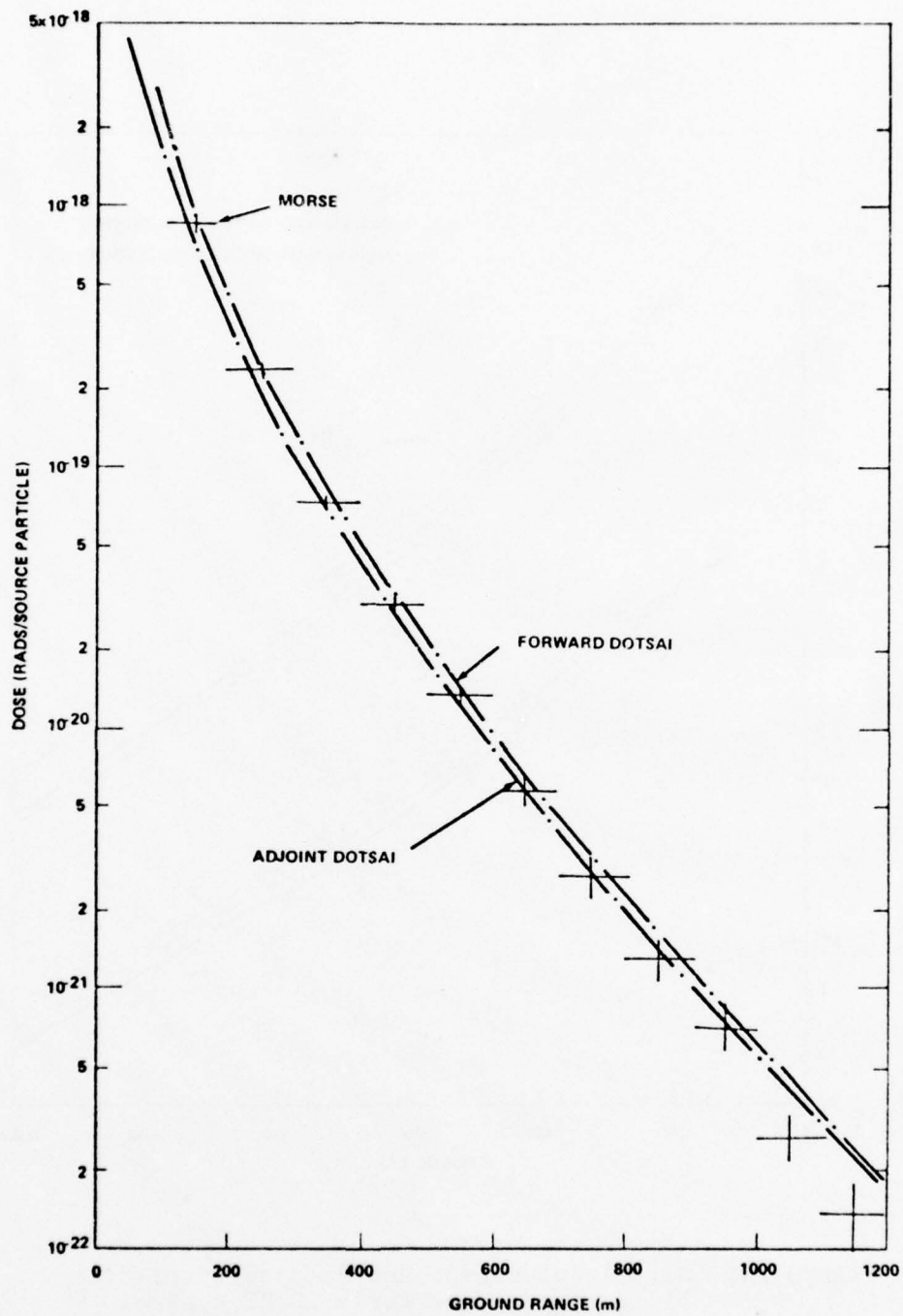


Figure 23. Calculated total free-field tissue dose from a low yield thermonuclear source 36.5 m above ground.

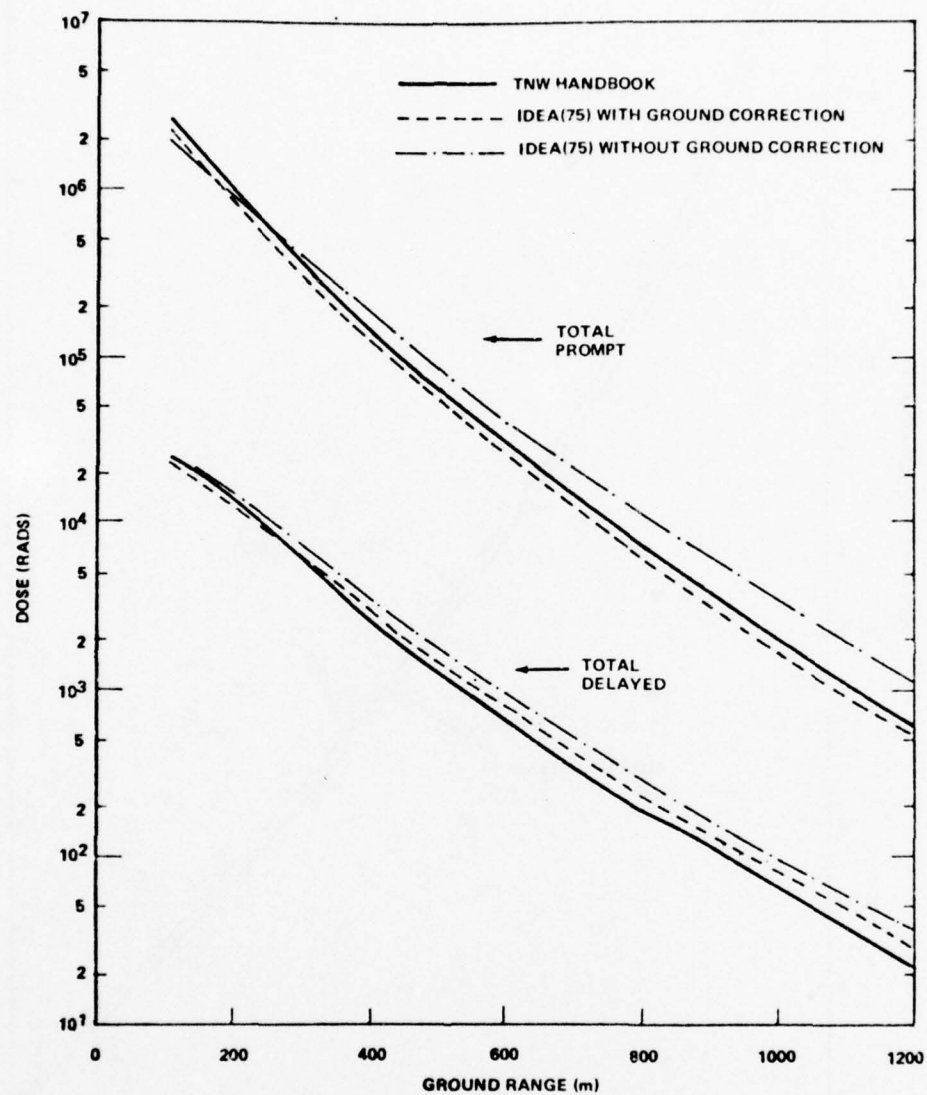


Figure 24. Calculated prompt and delayed total free-field tissue dose for a 10 KT typical thermonuclear burst 129 m above ground.

Comparisons have also been made with results predicted by a simplified tissue dose model (TDM) for this same weapon burst configuration⁽²²⁾. The total prompt and delayed free-field tissue doses as predicted by TDM and the handbook data base are compared in Figure 25.

The prompt dose from the simplified model is based on one-dimensional source energy importance distributions calculated for infinite uniform air. These importances were calculated using the same cross sections and air composition as were utilized for the handbook data base. Correction factors for the effect of the ground are those taken from ATR-Version 3. As is evident from the comparison shown, the agreement is very good.

The delayed radiation tissue dose model in TDM is based on a graphical procedure to calculate the fission product gamma ray dose. Although a hydrodynamic enhancement factor is utilized to account for the disturbed atmosphere, no correction is made for the effect of the ground on the delayed radiation. As is noted in the figure, the TDM results are approximately 50% higher than those predicted using the handbook data base and provide further evidence that the effect of ground on source gamma rays (based on older first-last collision models) is not treated properly at present.

A comparison of the experimental and calculated fission product gamma ray dose rate for a typical thermonuclear source located 450 meters above ground is shown in Figure 26. The detector slant range is 1440 meters from the burst. The calculated values shown were obtained using IDEA (75) and the methodology utilized to calculate the handbook delayed data base. For times greater than about 0.5 second the agreement is fairly good both in shape and magnitude, with the exception of times around 1.5 seconds. A sensitivity analysis indicates

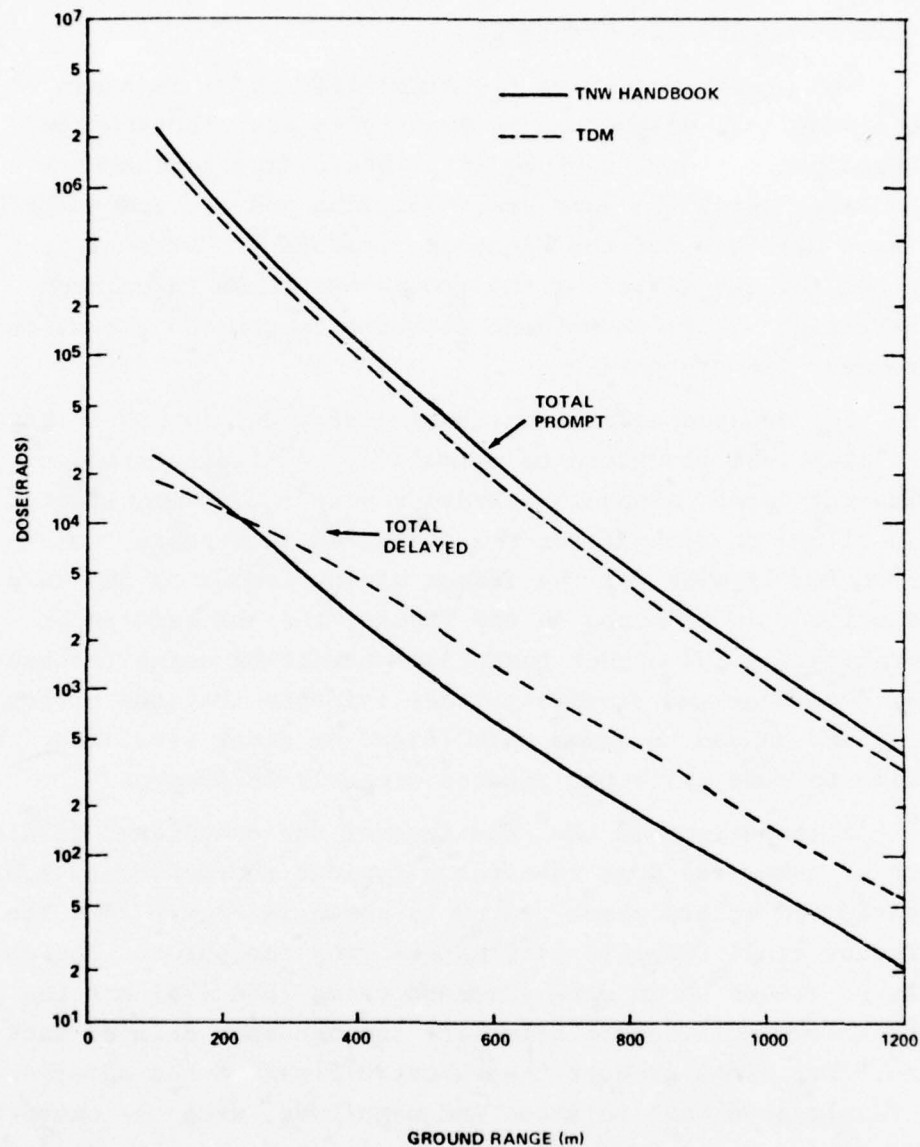


Figure 25. Calculated prompt and delayed total free-field tissue dose for a 10 KT low yield thermonuclear burst 129 m above ground.

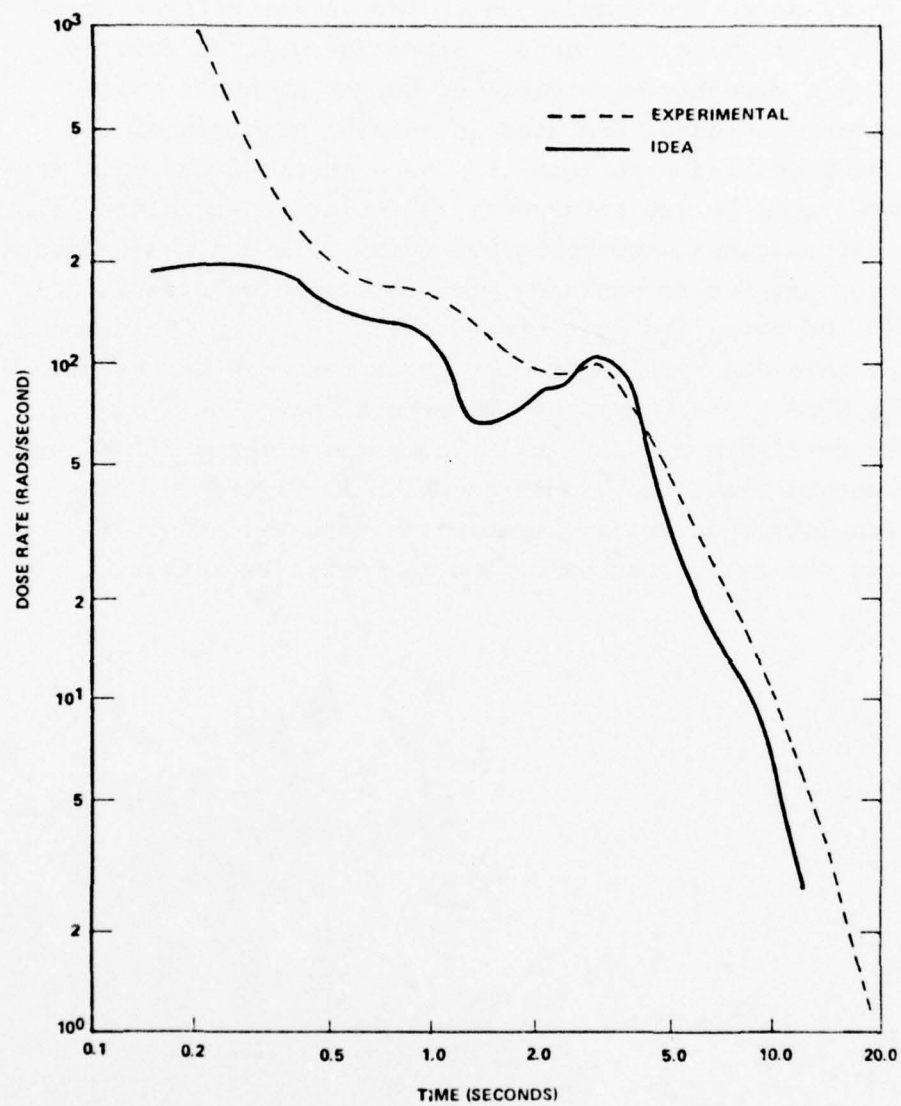


Figure 26. Calculated fission product gamma ray dose rate at 1371 m ground range from a 71 KT burst 450 m above ground.

that the disagreement for times less than 0.5 second is partially attributable to the fission product gamma ray source model utilized.

As noted previously, an edit code was written to process the handbook data base. Since the delayed dose does not scale directly with yield or height of burst, interpolation procedures are used in editing portions of the handbook delayed dose results. As a check of the edit procedures used to determine dose values at intermediate points, two calculations were performed using IDEA and the handbook methodology for comparison with interpolated dose values predicted using the edit procedures. The free-field and armor shielded fission product gamma ray dose versus ground range from a 5 KT burst at 100 meters above the ground is shown in Figure 27. A similar comparison for a 200 KT burst 350 meters above the ground is shown in Figure 28. The interpolation scheme employed gives dose values within about 10% of the calculated value and is therefore adequate.

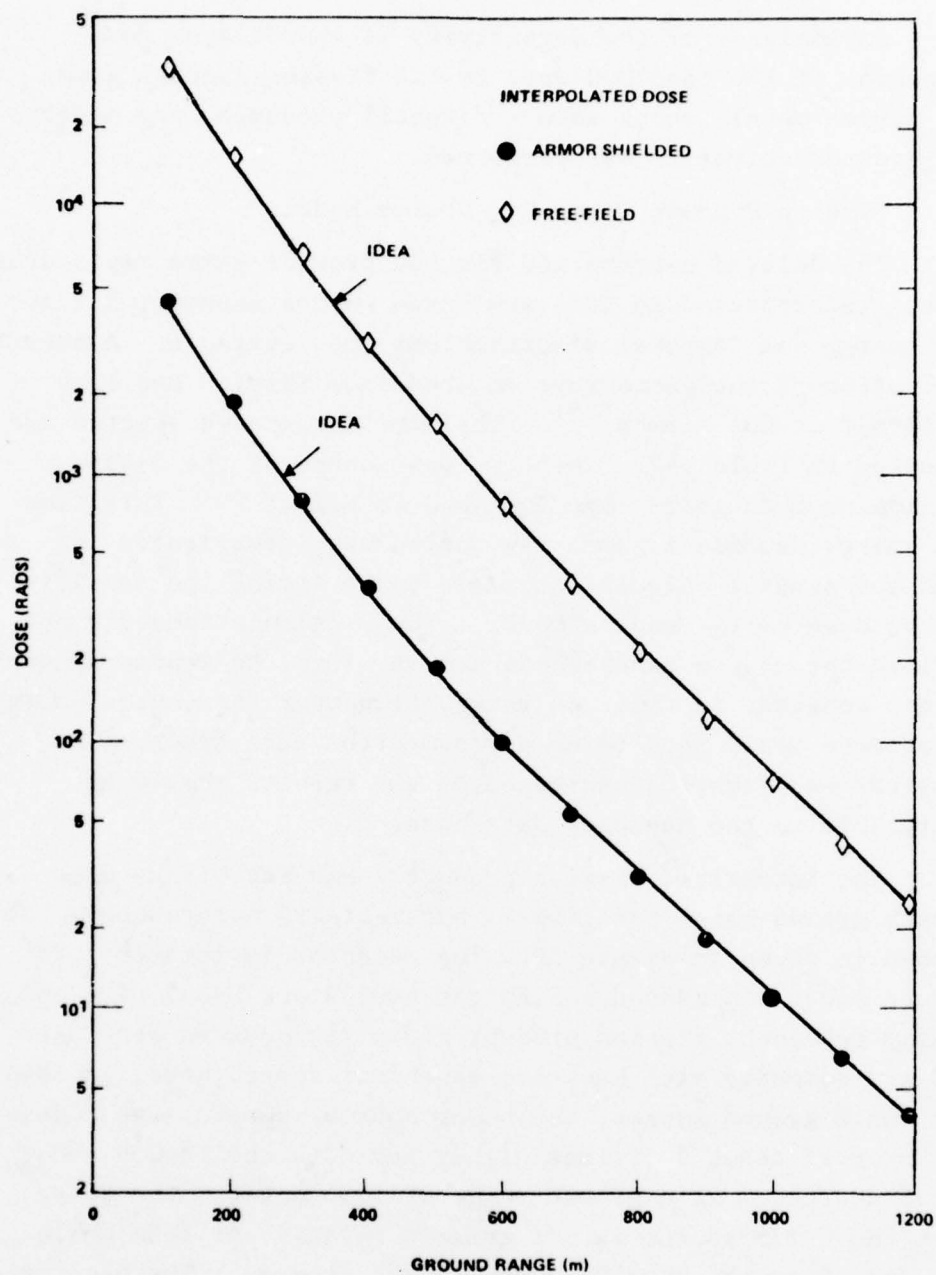


Figure 27. Calculated free-field and armor shielded fission product gamma ray dose from a 5 KT burst 100 m above ground.

6.2 DELAYED DOSE SENSITIVITY ANALYSIS

An analysis of the sensitivity of the delayed dose component of the handbook data to the fission product gamma ray source model, shock wave - fireball phenomenology model and ground activation was performed.

6.2.1 Fission Product Gamma Ray Source Model

The delayed neutron and fission product gamma ray source models incorporated in IDEA are based on the assumption that the energy and temporal distributions are separable. A recent evaluation of the gamma rays emitted from fission has been performed at Los Alamos⁽²³⁾. The time integrated spectra are compared in Table 147. The time dependence of the U-235 fission product gamma rays is shown in Figure 29. This time and energy dependent gamma ray source was incorporated in IDEA and several calculations made to determine the sensitivity of the dose to the source model. These calculations did not utilize the weapon handbook data base since the source spectra is not constant in time and integration over the source energy importance would need to be performed for each time period. Nevertheless, conclusions based on the results should be applicable to the handbook data base.

The integrated fission product gamma ray tissue dose versus ground range for a 10 KT burst at 129 meters above the ground is shown in Figure 30. The detector is located 1.75 meters above the ground. Both the Pu-239 and U-235 time and energy dependent fission product gamma ray sources were used and are compared with the time-dependent source model in IDEA. For small ground ranges, the newer source spectra give a dose a factor of about 2.5 times higher for both the Pu-239 and U-235 sources. At a ground range of 1200 meters, the dose from the U-235 source is 50% greater relative to IDEA while the dose from the PU-239 source is 25% greater. The dose rate

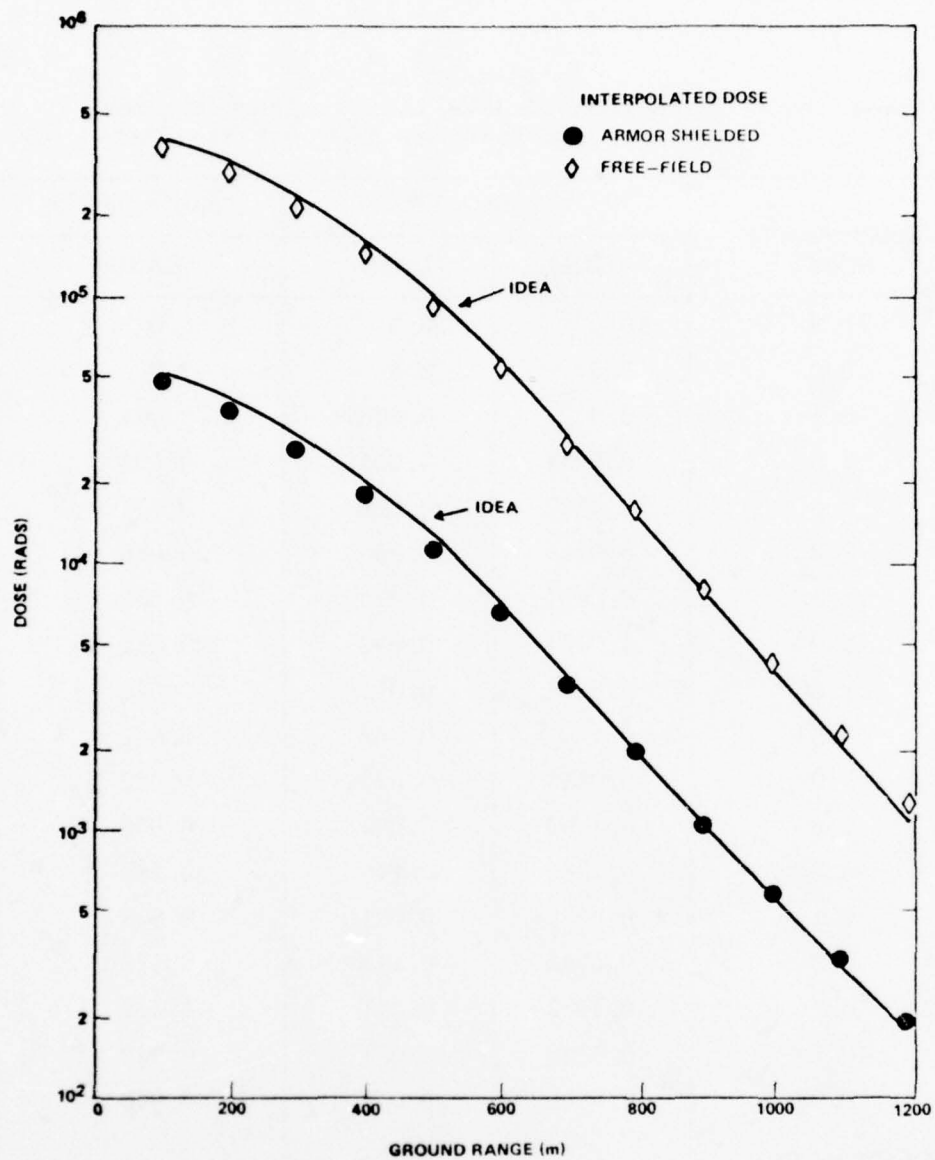


Figure 28. Calculated free-field and armor shielded fission product gamma-ray dose from a 200 KT burst 350 m above ground.

Table 147. Comparison of IDEA fission product gamma ray spectrum with Los Alamos evaluation.

Upper Energy (MeV)	Uranium-235		Plutonium-239
	IDEA	LASL	LASL
10.0	0.0	0.0	0.0
8.0	0.0	0.0	0.0
6.5	0.0	0.0069	0.004
5.0	0.0054	0.0048	0.003
4.0	0.0182	0.0213	0.017
3.0	0.0218	0.0200	0.018
2.5	0.0401	0.0300	0.027
2.0	0.0424	0.036	0.032
1.66	0.0644	0.053	0.049
1.33	0.100	0.089	0.082
1.0	0.0835	0.070	0.066
0.8	0.1090	0.095	0.092
0.6	0.1380	0.140	0.146
0.4	0.0835	0.084	0.093
0.3	0.0942	0.143	0.129
0.2	0.1052	0.141	0.162
0.1	0.0580	0.033	0.040
0.05	0.0363	0.033	0.040
ELOW = .02			
Total/KT	5.29(+23)	7.09(+23)	6.87(+23)

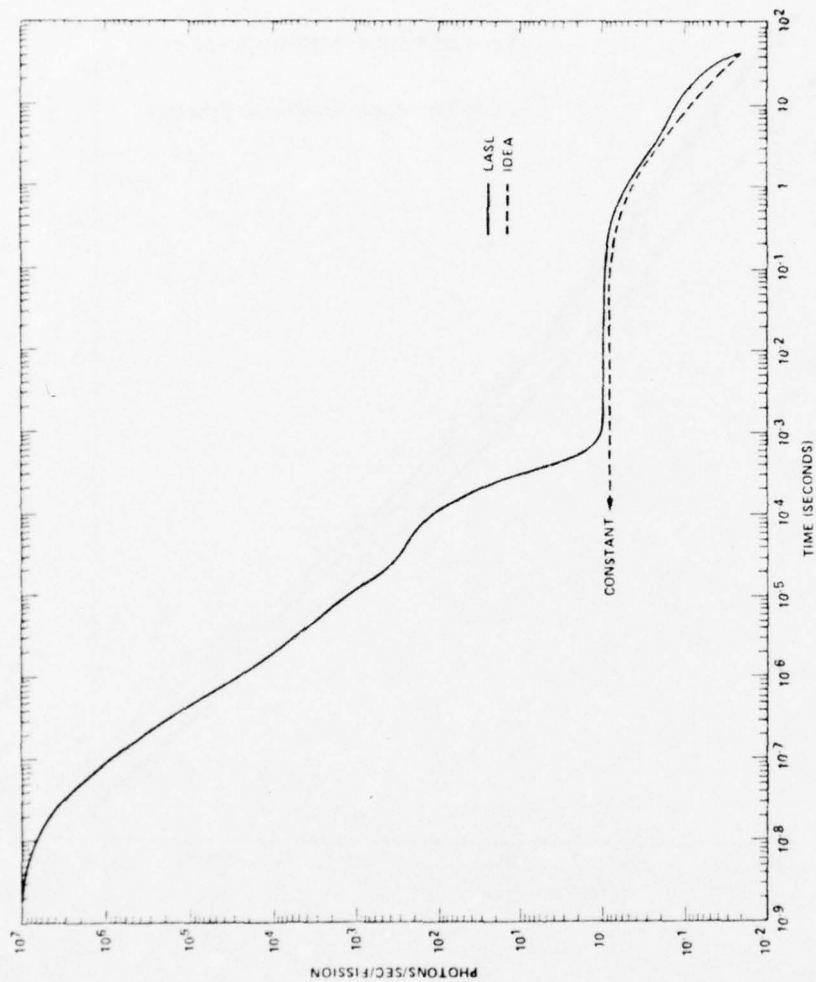


FIGURE 29
Comparison of Time Dependent Models of Fission Product Gamma Rays from U-235

Figure 29. Comparison of time dependent models of fission product gamma rays from U-235.

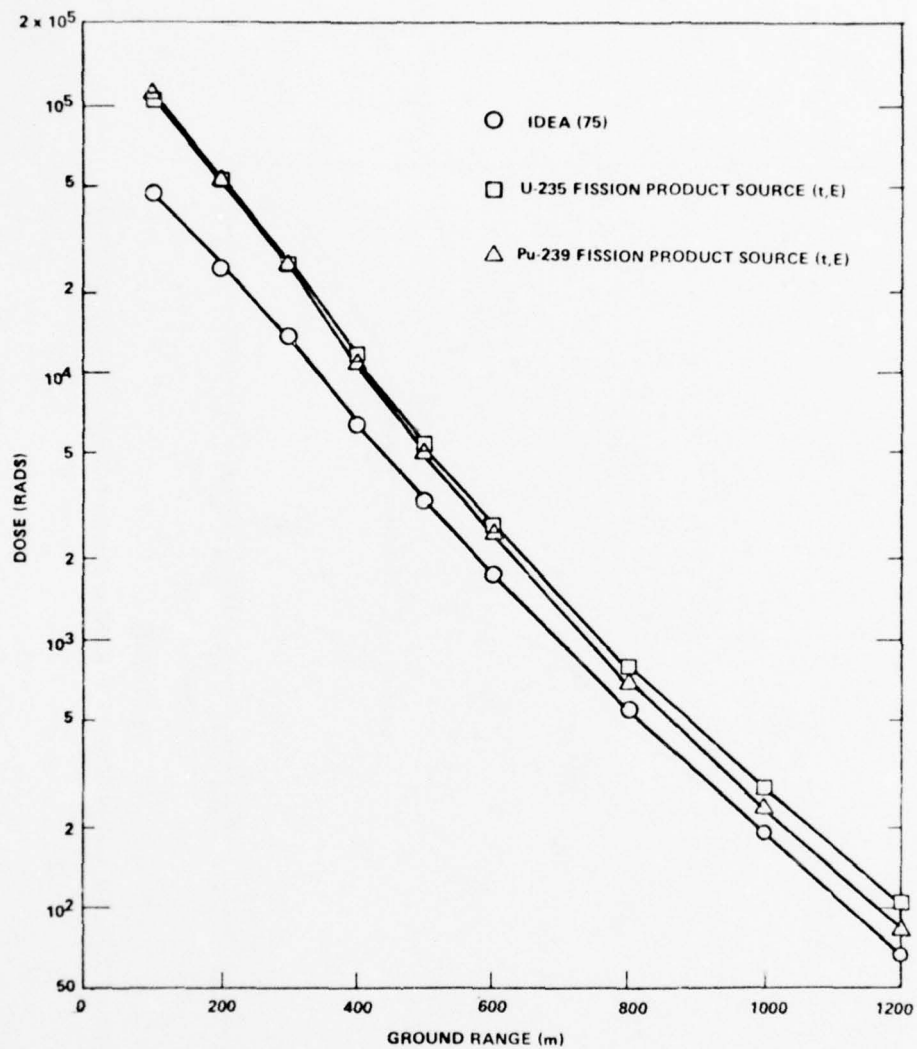


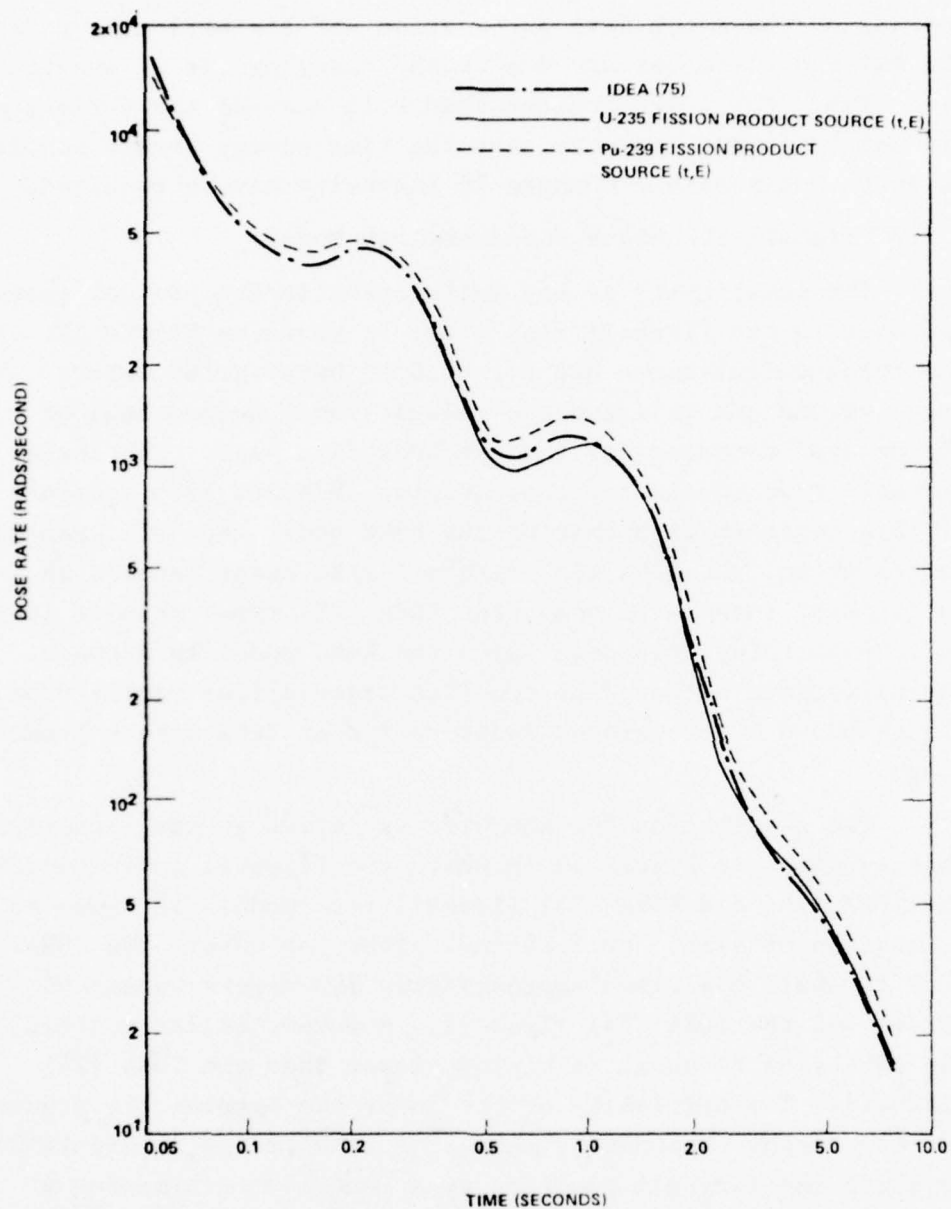
Figure 30. Calculated tissue dose from three fission product gamma ray source models for a 10 KT burst 129 m above ground.

at a ground range of 500 meters from these calculations is shown in Figure 31. Since the shape of the dose rate curve depends on the shock wave propagation and fireball rise rates, the major differences are due to the changing energy spectra with time. For times greater than 0.15 seconds the variations are not large and indicate that the time-energy separation is adequate but possible changes in intensity may be required.

6.2.2 Fireball-Shockwave Phenomenology Model

The sensitivity of the integrated fission product gamma ray dose to the fireball rise model is shown in Figure 32. The three calculations are for a 10 KT burst at 60 meters above ground and utilized the calculational methodology of the delayed component of the handbook data base. The three fireball rise models are those of the 1974 and 1975 versions of IDEA together with that of the RANC code. For all ground ranges shown, the IDEA (74) fireball rise model results in the highest integrated dose, the IDEA (75) model results in the lowest integrated dose, with the RANC model in between. The difference between the two IDEA calculations varies from 4.5 at 100.0 meters ground range to 2.0 at 1200 meters ground range.

The explanation for the wide variation in the integrated dose is given in Figure 33 in which the fireball position for the IDEA (74) and IDEA (75) fireball rise models is shown as a function of time. At 2 seconds after the burst, the IDEA (75) fireball has risen approximately 700 meters versus 50 meters for the IDEA (74) fireball. However, at later times the IDEA (75) fireball is rising slower than the IDEA (74) fireball. The complexity of the interplay between the ground and the rising expanding fireball is illustrated in Figure 34 in which the fireball position as a function of time for a 10 KT burst at several burst heights is shown. The data for the curves are from IDEA (75) and are taken from a portion of



CALCULATED FREE FIELD TISSUE DOSE RATE AT 500 m GROUND RANGE FROM THREE FISSION PRODUCT GAMMA RAY SOURCE MODELS FOR A 10 KT BURST 129 m ABOVE GROUND

Figure 31. Calculated free-field tissue dose rate at 500 m ground range from three fission product gamma ray source models for a 10 KT burst 129 m above ground.

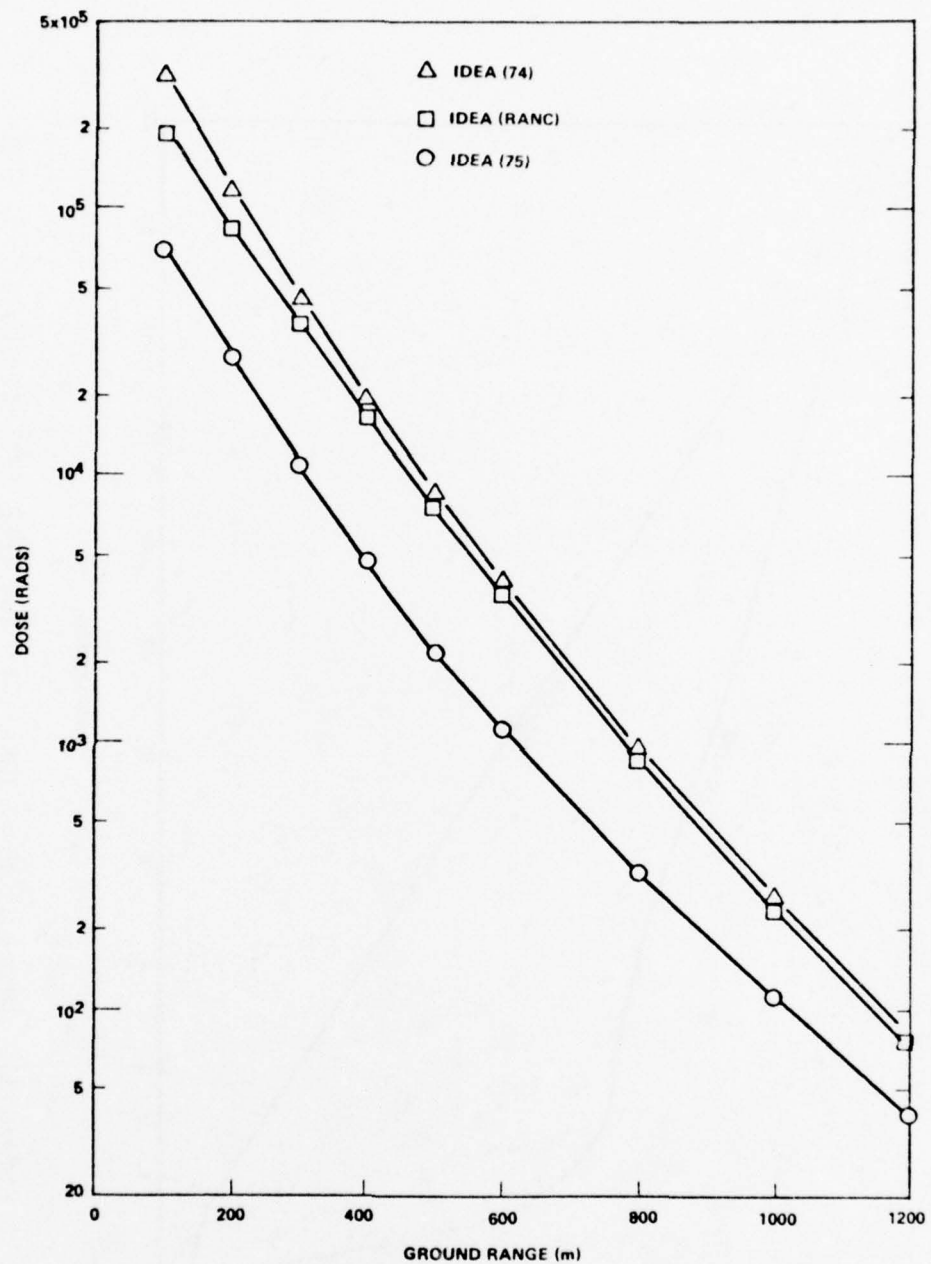


Figure 32. Calculated fission product gamma ray free field tissue dose as a function of fireball rise model for a 10 KT burst 60 m above ground.

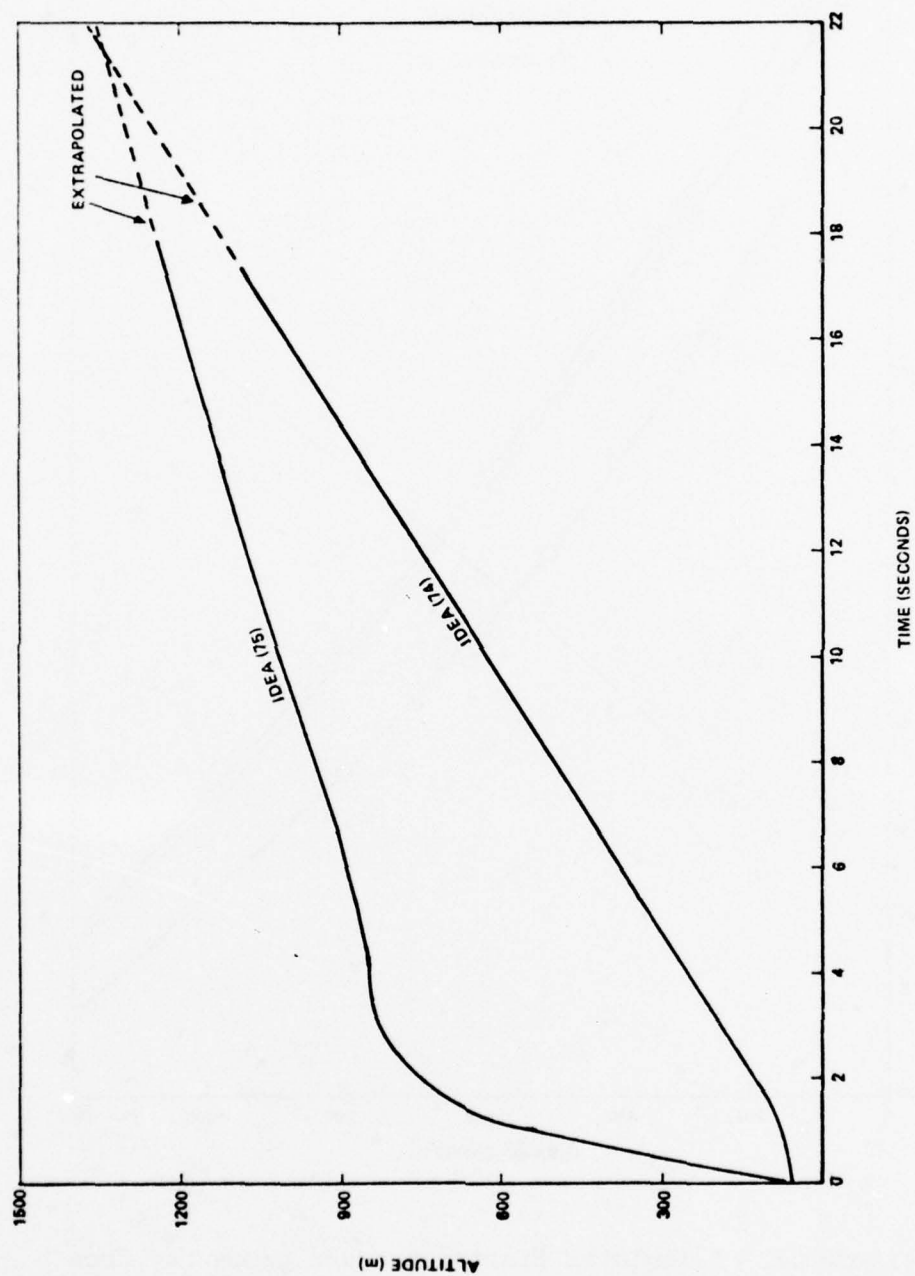


Figure 33. Comparison of IDEA (74) and IDEA (75) fireball position as a function of time for a 10 KT burst at 60 m above ground.

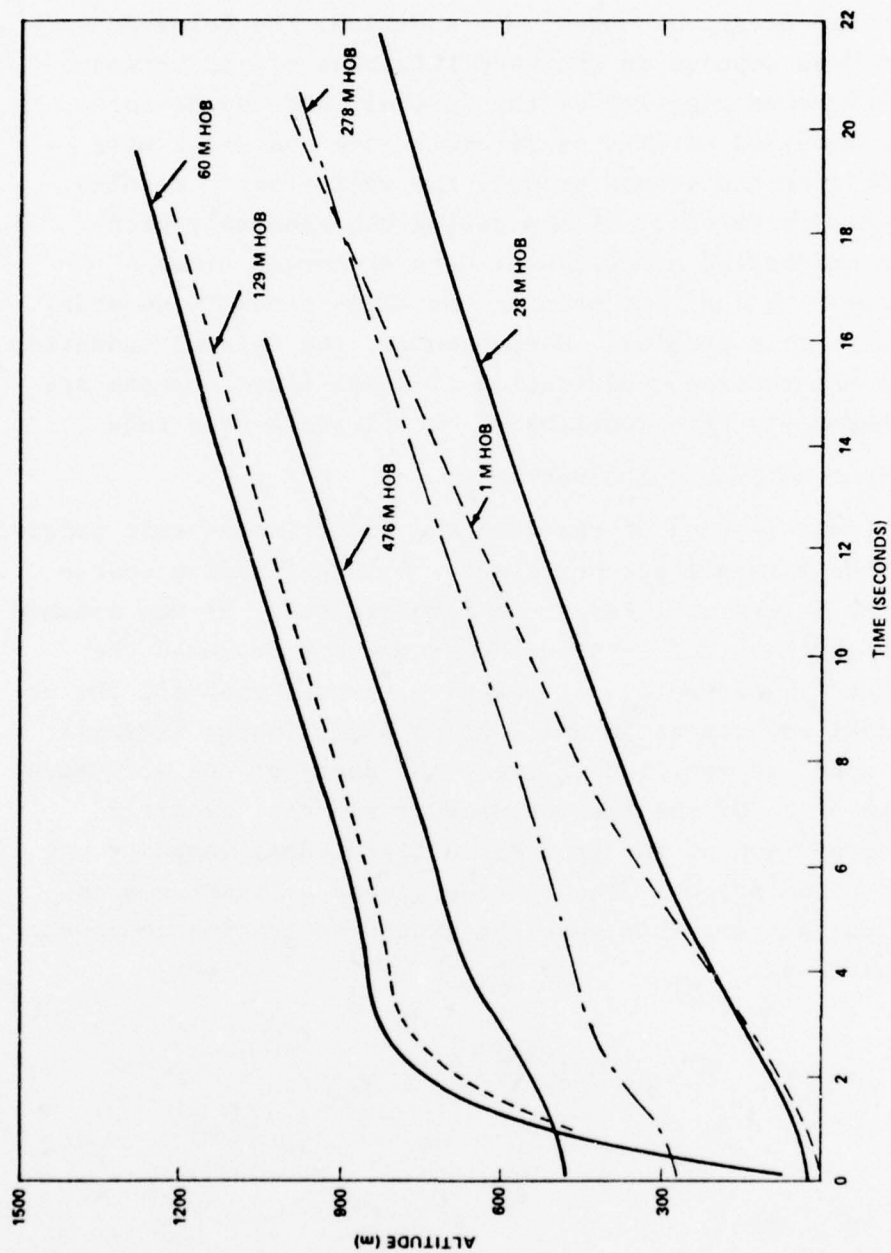


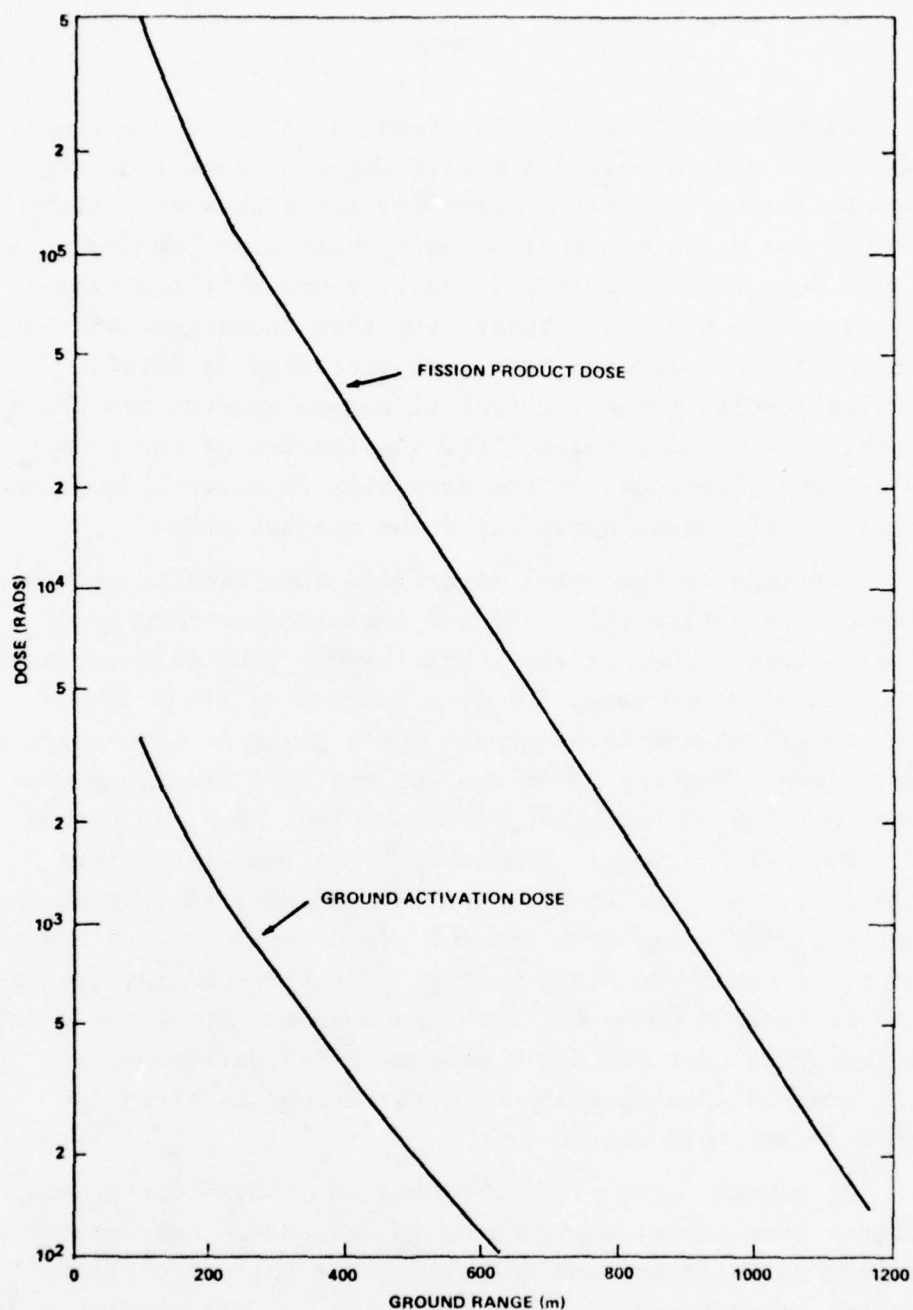
Figure 34. Fireball position as a function of time for a 10 KT burst for several heights of burst (HOB).

the calculations performed for the delayed dose component of the handbook data base.

The results shown in Figure 30 are not necessarily typical since the modeling of fireball rise depends on the yield and the height of burst. In addition, the delayed radiation dose depends on the mass thickness of air between the instantaneous position of the fireball and the detector. Thus, the combined effects of fireball rise and shock wave reflection from the ground produce the variation in results. The emphasis in fireball rise modeling has generally been placed on predicting experimental data at larger times (\sim minutes) with less emphasis on the early times (\sim seconds) important in this problem. Consequently, the delayed radiation data base may require modification if significant changes are made to the early time modeling of the fireball rise rate.

6.2.3 Effect of Ground Activation

An investigation of the dose due to activated soil carried aloft in the fireball was performed. A 10 KT fission source for a burst height of 1 meter was investigated. It was assumed that half the neutrons entered the ground and produced the resulting activated soil. It was also assumed that all the activated soil was vaporized and carried aloft in the fireball. The IDEA code was modified to treat the decay of the activated sources in place of the fission product source. Figure 35 shows a comparison of the free-field tissue dose versus range for the fission product dose and the ground activation dose. It is noted that for this case the ground activation component is insignificant.



COMPARISON OF FREE FIELD TISSUE DOSE FROM FISSION PRODUCT GAMMA RAYS
AND GROUND ACTIVATION FOR A 1 KT BURST 1 m ABOVE GROUND

Figure 35. Comparison of free-field tissue dose from fission product gamma rays and ground activation for a 1 KT burst 1 m above ground.

7. SUMMARY

This report documents the results of a study performed to generate a data base for predicting the radiation environment of tactical nuclear weapons for air bursts over flat ground. The radiation environment consists of the prompt and delayed dose for a free-field and an armor shielded tissue detector. The state-of-the-art solution techniques and data used in the calculations have been described in detail. Detailed results for a few typical weapon spectra have been presented in various forms. The sensitivity of the prompt and delayed components of the data base to several important parameters has been investigated and results shown.

Portions of the total free-field dose results previously presented in Tables 115 - 138 are summarized in Figures 36 - 44. Shown in each figure is the total (prompt plus delayed) tissue dose versus ground range for four heights of burst from 1 meter to 476 meters above ground for a given weapon source and blast yield. Figures 36-39 are for the EM-1 fission source given in Table 42 for blast yields of 5.0, 10.0, 30.0 and 100.0 KT, respectively. The assumed fission/blast yield ratio is 1.0 for the fission source. Figures 40-43 show the predicted total dose from the low yield thermonuclear weapon source for the above blast yields. The fission/blast yield ratio is assumed to be 0.5 for this weapon. Since the delayed dose component for the Henre source is insignificant, the total dose/KT as a function of burst height is given in Figure 44 for this source.

In general, the predicted dose in an air-over-ground geometry from prompt neutrons is in reasonable agreement with previous calculations and do not exhibit the calculational problems encountered in other studies⁽²⁴⁾. The predicted dose from secondary gamma rays is about a factor of two lower than previously published data. These observed differences are

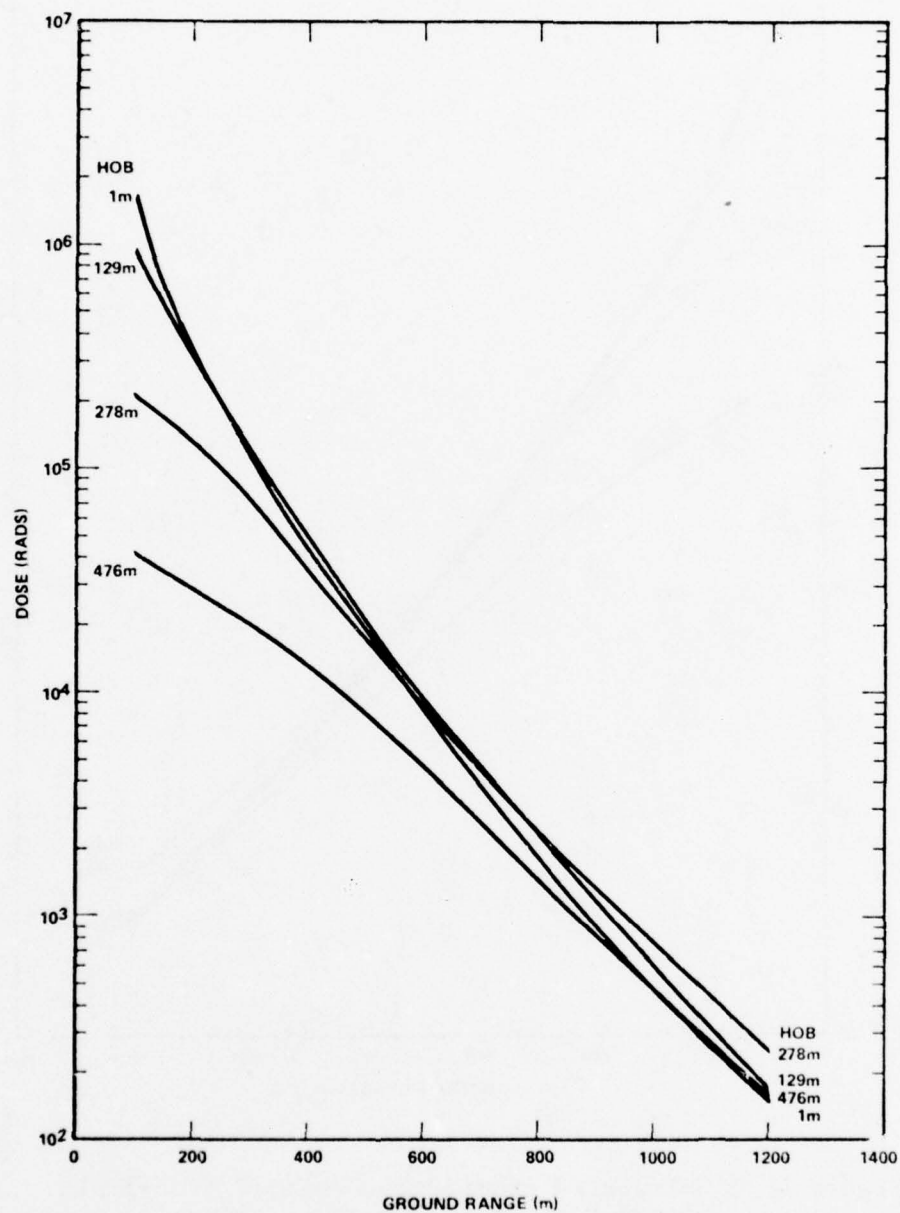


Figure 36. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for a 5 KT fission source.

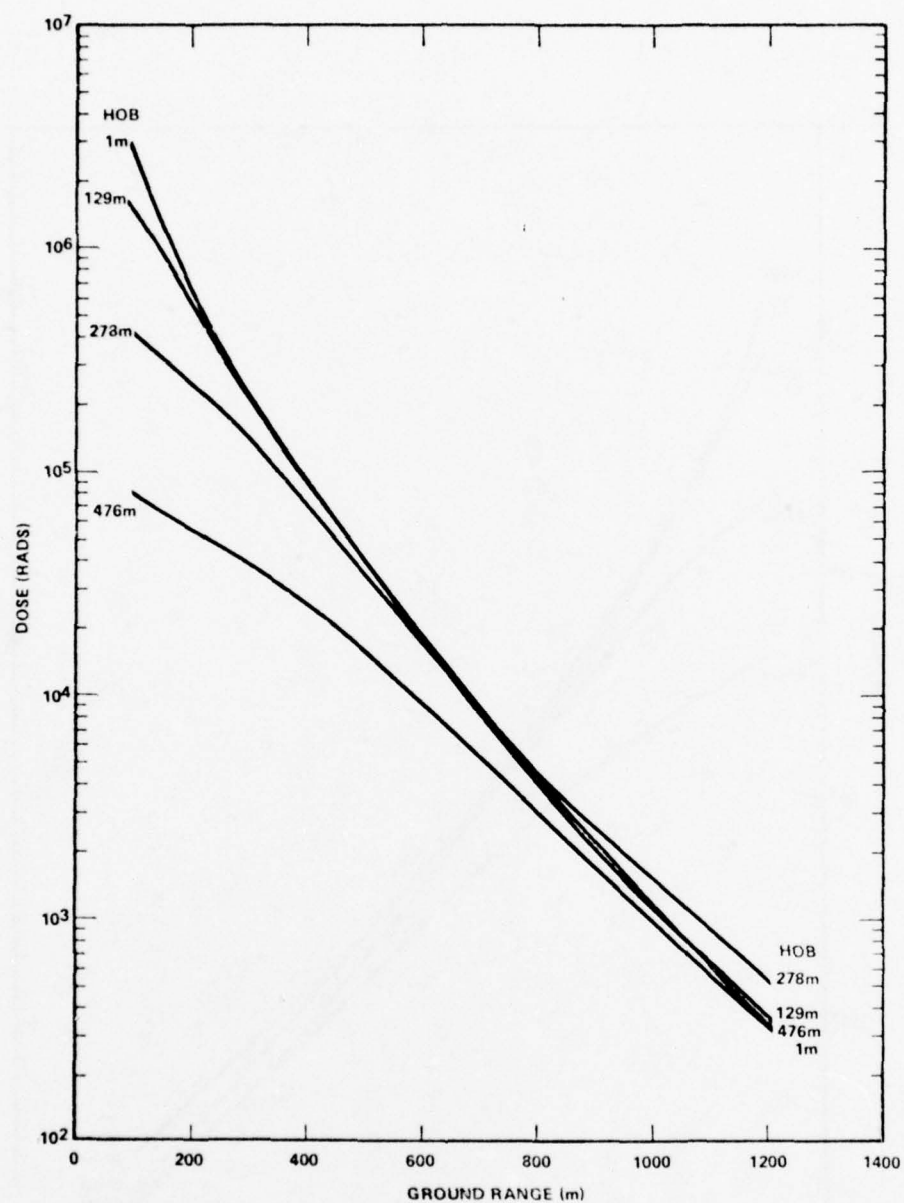


Figure 37. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for a 10 KT fission source.

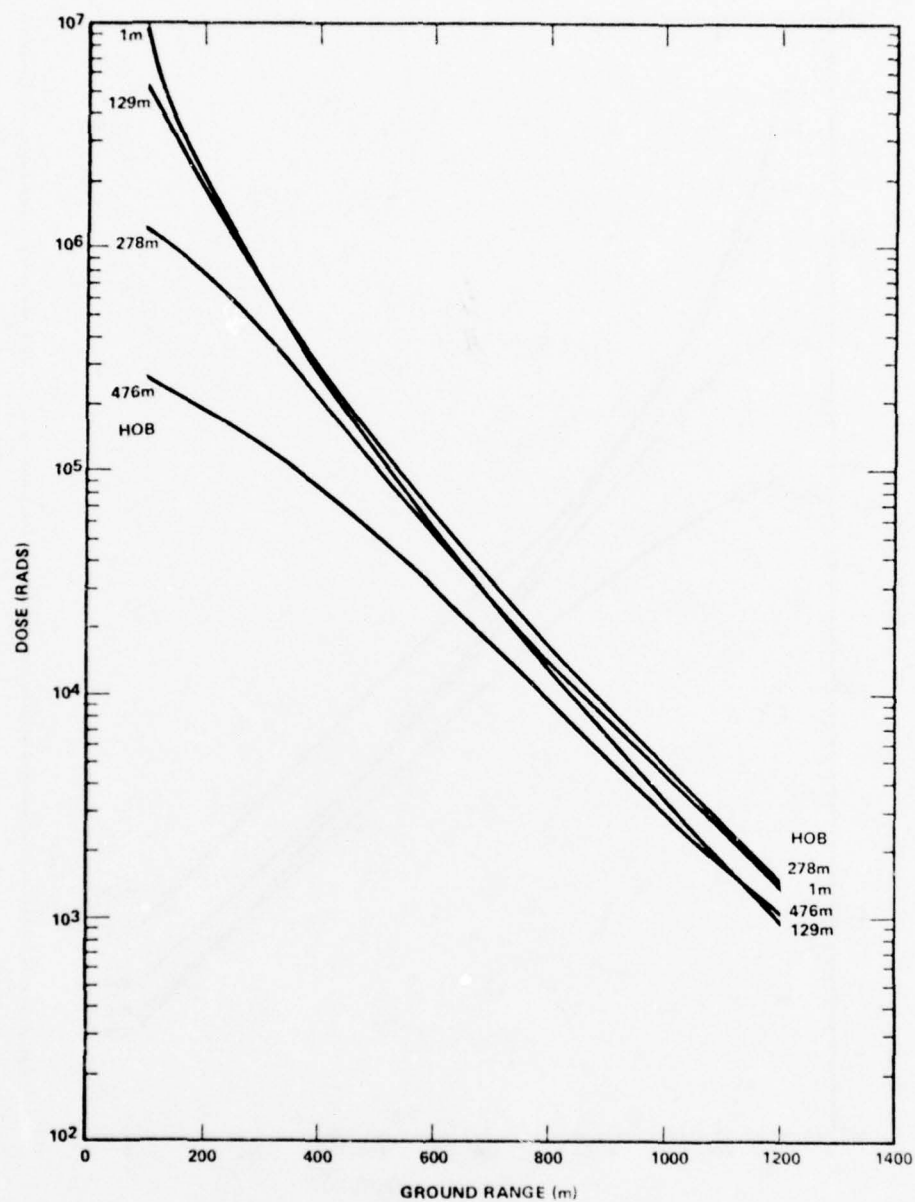


Figure 38. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for a 30 KT fission source.

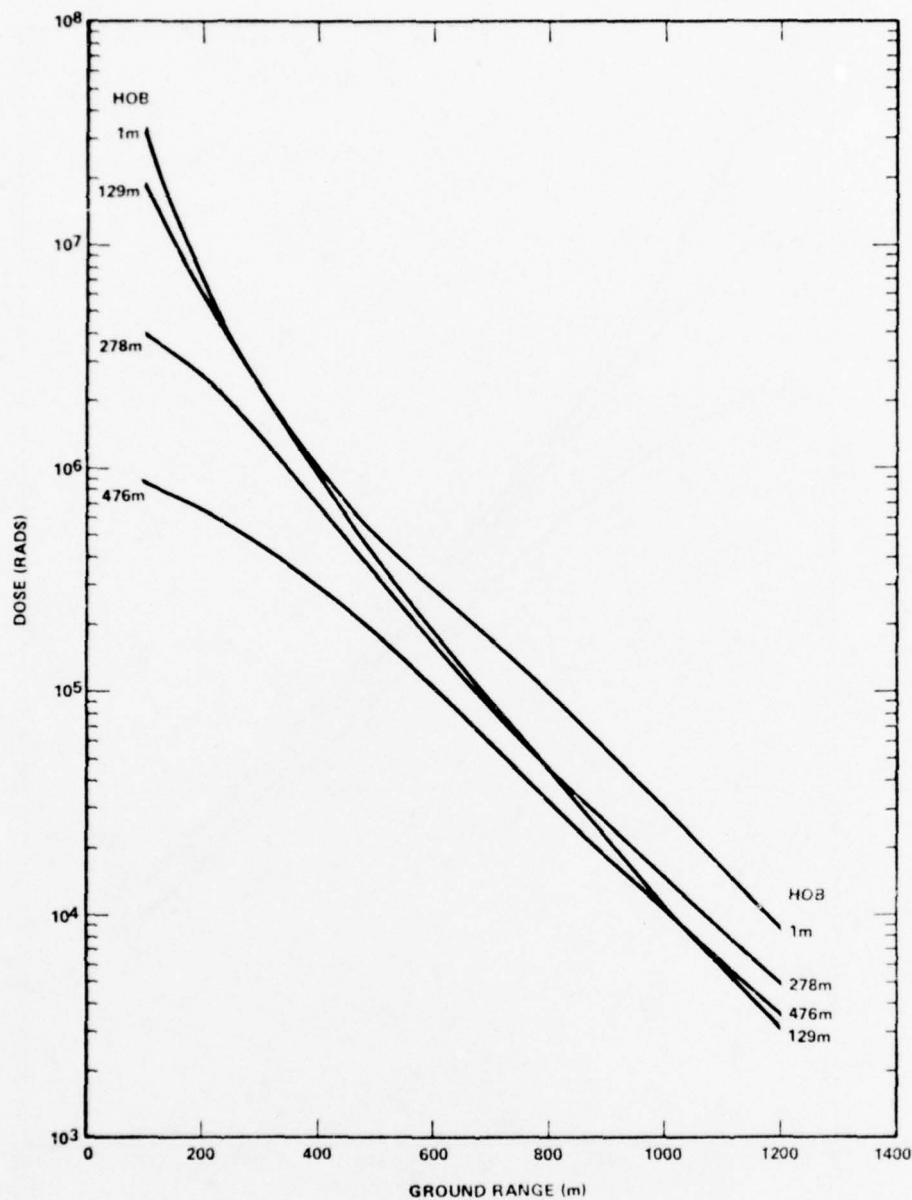


Figure 39. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for a 100 KT fission source.

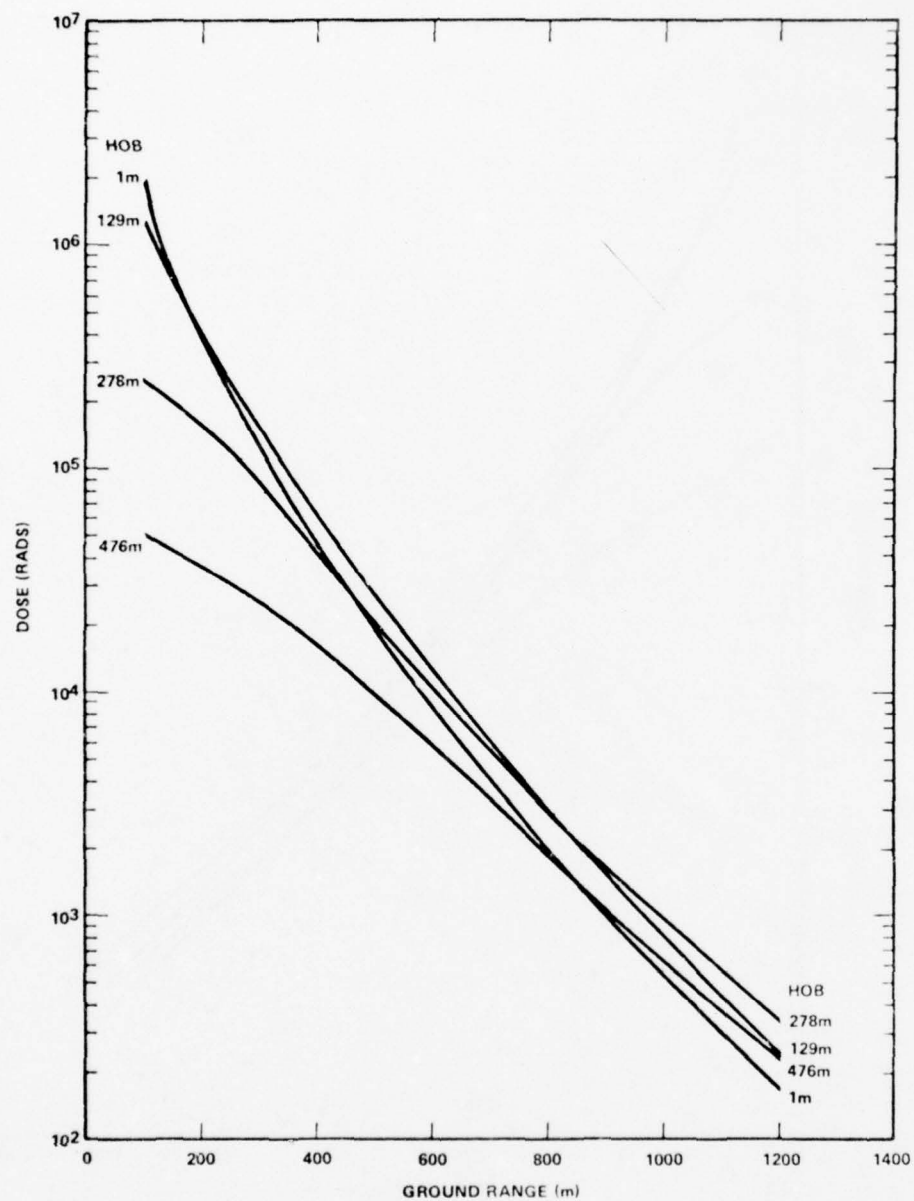


Figure 40. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for a 5 KT low yield thermonuclear source.

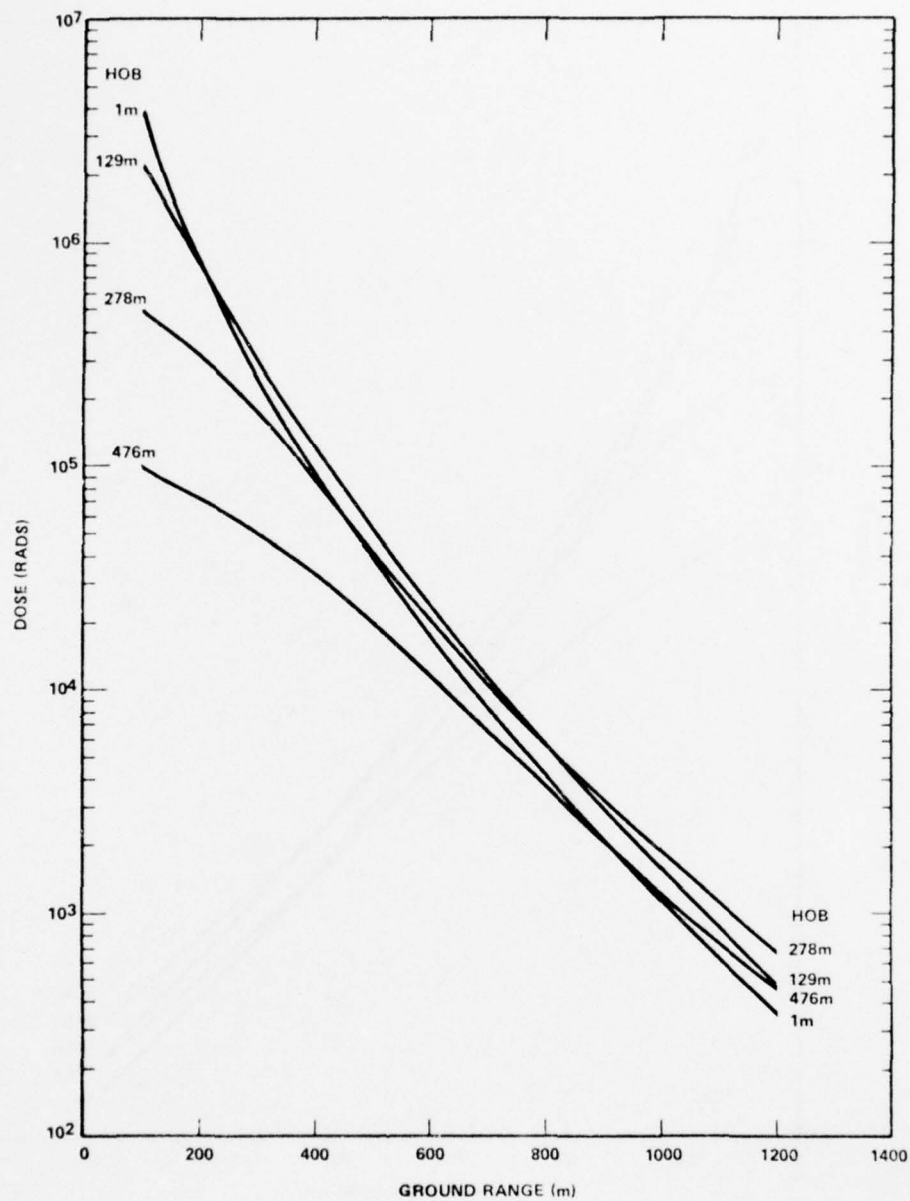


Figure 41. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for a 10 KT low yield thermonuclear source.

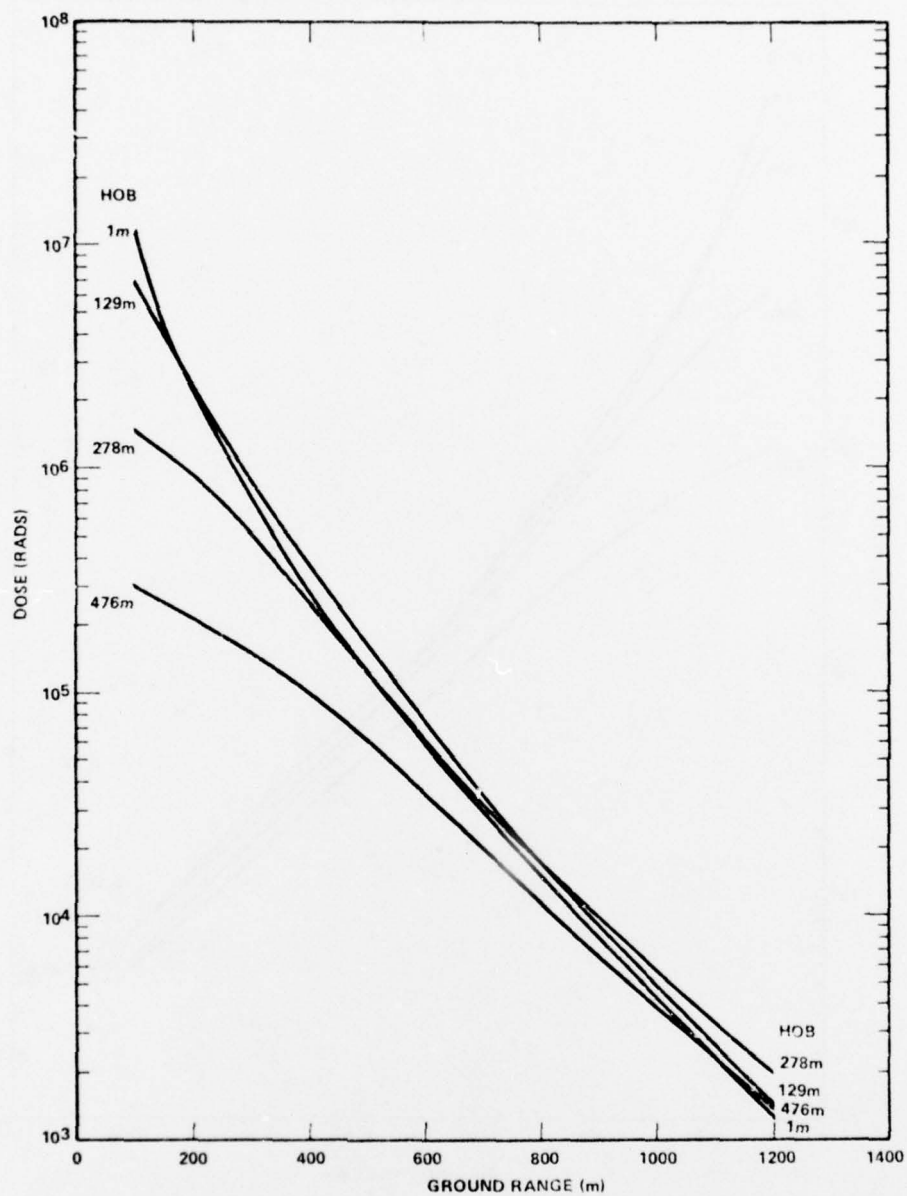


Figure 42. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for a 30 KT low yield thermonuclear source.

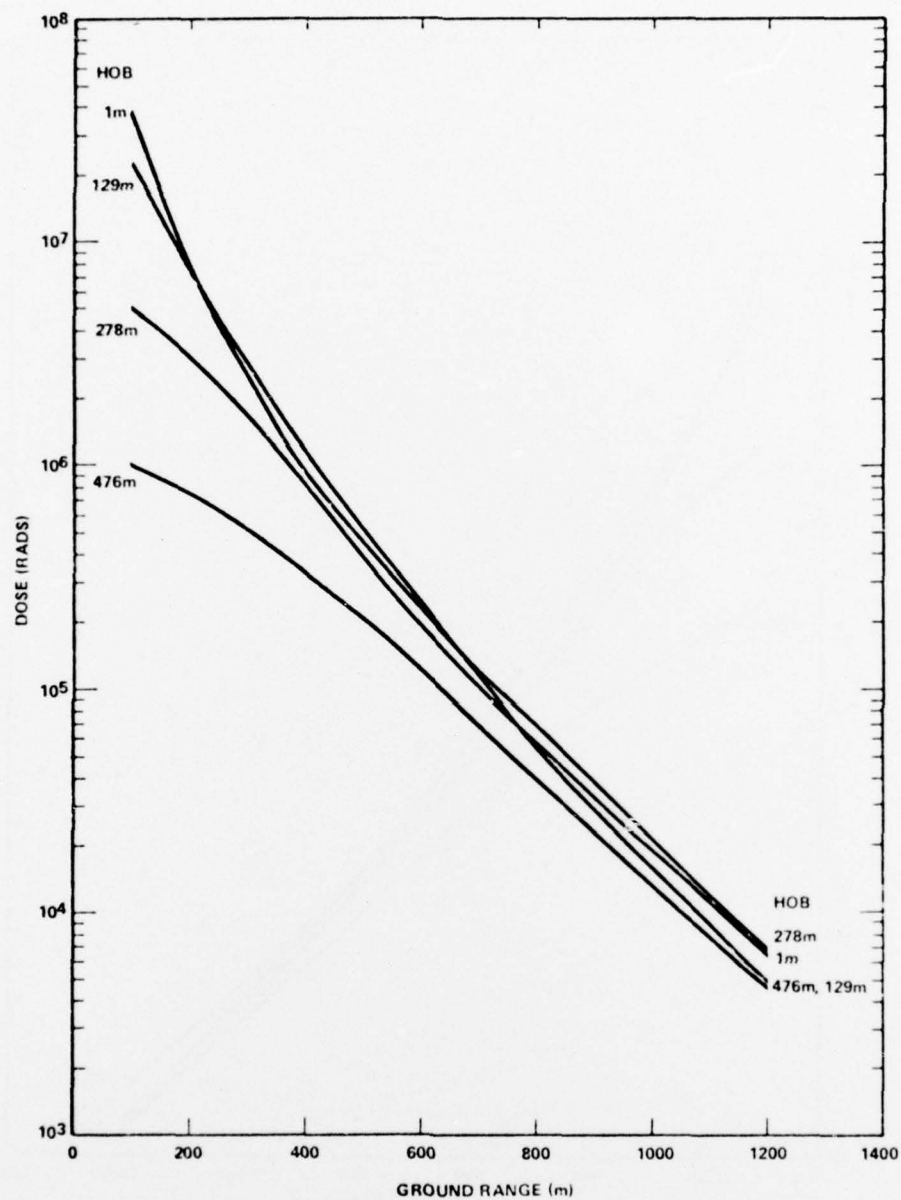


Figure 43. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for a 100 KT low yield thermonuclear source.

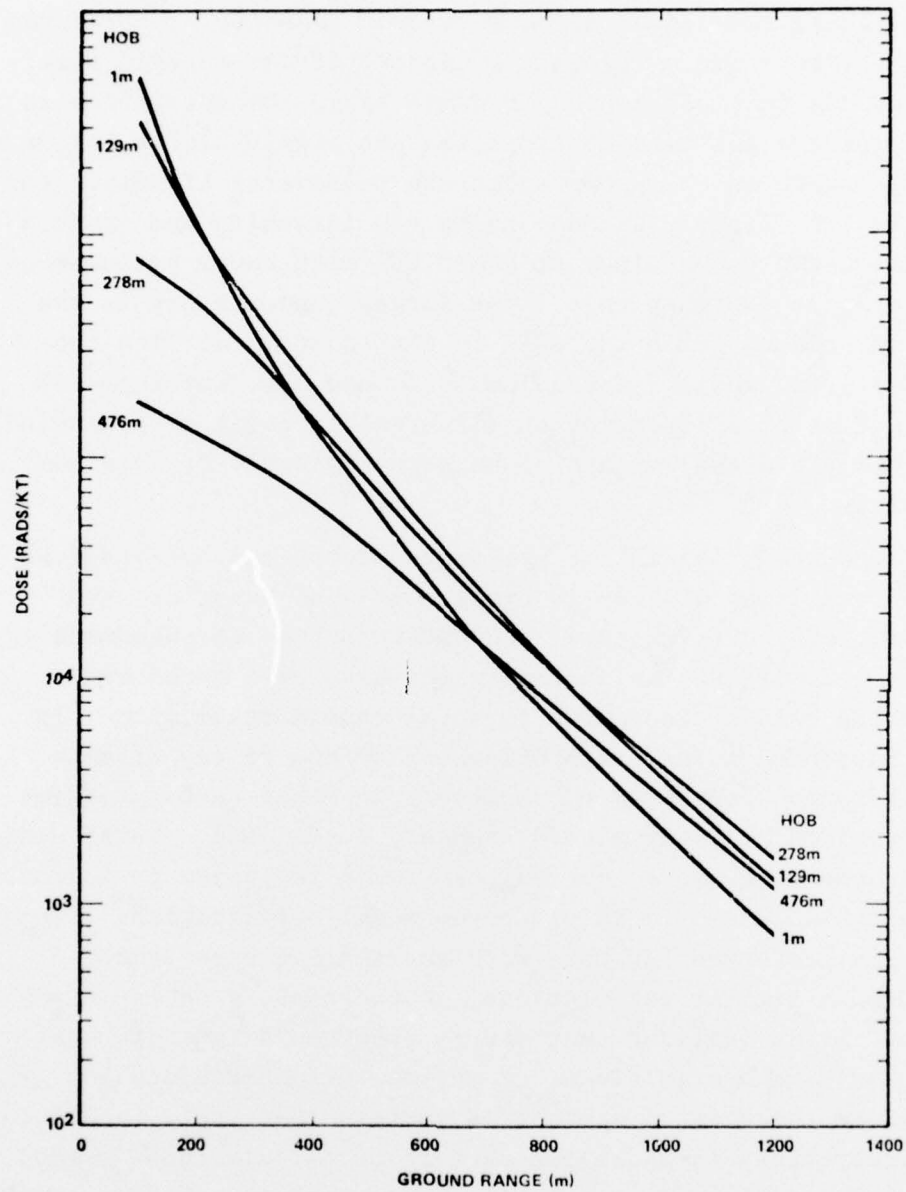


Figure 44. Calculated prompt plus delayed free-field tissue dose at 1.75 m above ground as a function of burst height for the Henre source.

primarily the result of improvements in the cross section data base utilized and in the application of state-of-the-art transport methods. The prediction of the dose from prompt source gamma rays in an air over ground geometry is presented for the first time. The main component of the delayed dose is that due to fission product gamma rays. Uncertainties in these results for delayed radiation are significantly larger than uncertainties in the prompt dose due to several effects. For example, the fission product gamma ray intensity and spectra contribute an uncertainty of about 50% with newer evaluations resulting in a higher dose. The largest uncertainty in the fission product gamma ray dose is that associated with the fireball rise model. The calculated dose may vary from 70% to a factor of 3 depending on different fireball rise models for some yield and heights of burst as a result of this uncertainty.

Uncertainties in the predicted prompt and delayed dose arise from uncertainties in cross sections, numerical and calculational difficulties, and uncertainties in phenomenology models. Cross section uncertainties have been noted by comparing calculations with integral experimental data. In some instances numerical problems arose due to ray effects and iteration convergence. However, in other cases problems were avoided by using albedo boundary conditions. Uncertainties in phenomenology were investigated for a few cases to indicate where emphasis should be placed on model verification. From the analysis performed for this work and through experience in performing similar calculations, an uncertainty table is suggested. It is realized that source spectra, height of burst, etc. can have a significant effect on the uncertainty and therefore there is no one set of numbers that apply to all cases. The uncertainty includes the effects of calculational method, data and model and should apply to the typical problems involving yields less than 100 KT.

The uncertainties given in Table 148 are smaller for scaled burst heights greater than 200 meters and are perhaps larger for lower heights of burst. Reduction of the uncertainties in the prompt radiation would require high accuracy experimental transport results for both neutrons and gamma rays. To reduce the uncertainty in the delayed radiation, further analysis of existing experimental data and critical review of existing phenomenology modeling is required.

Further observations concerning the results depend on the burst conditions investigated. The delayed component of the dose may be a significant fraction of the total dose for near surface bursts with a large fission yield. In some instances the delayed dose can be a factor of 2 - 4 greater than the prompt. For the simplified armor shielded tissue detector model, the armor reduces the dose from source neutrons and gamma rays but becomes a source of secondary gamma rays. The net reduction in the dose due to the armor as compared to the free-field tissue detector is not large and primarily changes the neutron to gamma ray dose ratio.

In summary, state-of-the-art methods and data have been utilized to generate a data base for the analysis of the radiation environments from tactical nuclear weapons.

Table 148. Uncertainties for tissue dose in an air/ground geometry.

Dose Component	Uncertainty	
	At 1000 m	At 2000 m
Prompt Neutron	$\pm 25\%$	$\pm 50\%$
Secondary Gamma Ray	$\pm 30\%$	$\pm 50\%$
Prompt Gamma Ray	$\pm 10\%$	$\pm 20\%$
Delayed Gamma Ray	$+ 300\%$ $- 50\%$	$+ 200\%$ $- 50\%$

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APPENDIX A

An example is provided to demonstrate the use of the energy dependent importance function data such as that found in Tables 14 - 41. As noted in the text, the importance function when multiplied by a source results in the dose.

Consider the problem of calculating the free field neutron tissue dose at a ground range of 800 meters from a 10 KT Henre source at 129 meters above ground. Table 42 gives the source energy spectrum and the importance is taken from Table 26. Table A1 illustrates the required calculation, namely

$$D(r) = W \sum_{i=1}^{23} S_i I_i(r)$$

where

$D(r)$	is the dose at ground range r ,
W	is the total yield in kilotons,
S_i	is the source intensity in energy group i ,
$I_i(r)$	is the neutron source importance for energy group i at ground range r .

The results shown in Table A1 should be compared with the dose given in Table 73. The slight difference is attributable to round-off error.

Table A1. Calculation sheet for sample problem.

Group, i	Energy Range (MeV)	Source, S_i (neutrons/KT/group)	Importance, $I_i(r)$ (rads/neutron/group)	$S_i \cdot I_i(r)$ (rads KT)
1	15.0 12.2	7.10 (+23)	9.57 (-21)	6.79 (+3)
2	12.2 10.0	8.00 (+22)	9.74 (-21)	7.79 (+2)
3	10.0 8.18	4.00 (+22)	1.08 (-20)	4.32 (+2)
4	8.18 - 6.37	2.98 (+22)	1.19 (-20)	3.55 (+2)
5	6.37 - 4.96	3.02 (+22)	1.44 (-20)	4.35 (+2)
6	4.96 - 4.06	3.00 (+22)	1.14 (-20)	3.42 (+2)
7	4.06 - 3.01	3.00 (+22)	1.07 (-20)	3.21 (+2)
8	3.01 - 2.38	2.22 (+22)	9.84 (-21)	2.18 (+2)
9	2.38 - 2.30	2.55 (+22)	8.98 (-21)	2.29 (+2)
10	2.30 - 1.83	1.83 (+22)	6.35 (-21)	1.16 (+2)
11	1.83 - 1.11	7.00 (+21)	4.43 (-21)	3.10 (+1)
12 - 23	1.11 - 1.0 (-7)	0.0	--	0.0
Total (per KT)		1.0 (+24)		1.00 (+4)
Total for 10 KT		1.0 (+25)		1.00 (+5)

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